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Cleaveland, C.H.

Causes and cure of diseases of the
feet.



CAUSES AND CURE
OF
DISEASES OF THE FEET:
WITH
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PRACTICAL SUGGESTIONS AS TO THEIR
CLOTHING.

BY

C. H. CLEAVELAND, M. D.

ILLUSTRATED.



CINCINNATI:
PRINTED BY BRADLEY & WEBB.
1862.

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P R E F A C E .

THE large armies of the nation which have been in the field during the past year, have suffered so much from various diseases of the Feet, that not only the attention of surgeons has been specially directed to that part of the system, but the people have realized the very great importance which attaches to those derangements, and are ready to be instructed in their *Causes* and *Cure*. To supply, in part, the information which was not readily attainable, even by physicians, a portion of the following work was published in the "JOURNAL OF RATIONAL MEDICINE."

Those articles having attracted considerable attention, I have thought the interests of the profession and of the people would be subserved by re-publishing them, with additions, in the present form,—particularly as no work covering the same ground had been published in America.

That the Feet, and the diseases to which they are liable, and the *Causes* of those diseases, avoidable or otherwise, are worthy of far more attention than has been bestowed upon them by the majority of the profession, none will deny; and it is hoped this monograph may serve to direct the minds of physicians to that part of the system, and thus aid in protecting the people from the impositions of ignorant and designing pretenders.

That parents may be led to pay more attention to the Feet of their children, to protect and preserve them from the deformities and diseases under which a large portion of the community

suffer, it is necessary that physicians call their attention to this subject, and supply them with such information as will explain the direct and immediate connection between distorted, deformed and diseased Feet, and improperly constructed boots and shoes.

In the proper construction of the covering of the Feet all mankind are interested, and when it is known that most of the diseases and deformities to which the lower extremities are liable, are the direct or indirect products of want of knowledge and want of thought on the part of shoe and boot makers and the people, even a casual perusal of the following pages can not fail of doing some good.

That the evils which are produced by badly constructed boots and shoes may be remedied where they already exist, and avoided by the proper application of the teachings of plain, enlightened common sense in the formation and adaptation of the clothing of the Feet, it is thought, is fully proved. And that the feet can be clothed so as to be protected from exposure and injury, while such clothing will be in accordance with enlightened taste and the teachings of science, is also plainly demonstrable.

With the hope that this work will be found to answer the purposes for which it was written it is now presented to its readers by

THE AUTHOR.

CINCINNATI, 1862.

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DISEASES OF THE FEET.

ON THE GENERAL MANAGEMENT OF THE FEET.—
On the maintenance of the feet in a state of health, a very great amount of the comfort and pleasure of persons in the ordinary walks of life, directly depends. Even the fate of armies, and perhaps the destiny of a nation, may, in a great measure, be influenced by the condition of the feet of its soldiers. And hence a work devoted to the consideration of this matter seems now to be specially timely and important. As but little can be found in ordinary works on surgery respecting the proper management of the feet, in health and in disease, the remarks made here will be somewhat minute on those points not mentioned in the works at the command of the profession.

The directions may appear to the casual observer trivial and unimportant; but those who have suffered the torture that follows an attempt at walking while the foot is diseased, will not consider even apparently trivial directions uncalled for, as there is no part of the human frame whose condition has more influence on our comfort or discomfort, or which demands more personal care and attention.

“From the first wearing of socks and shoes, great care and attention are requisite. In childhood, the socks in summer should be made of fine cotton or silk, in cold weather of a woolen fabric, and of sufficient length that every toe may have room to extend itself.

“The feet should be washed evening and morning, the same as are the hands, and wiped thoroughly dry, particularly between the toes, and the nails should not be cut too often, nor at any time shorter than to be on a level with the tops of the toes.

It is also advisable that the shoes be a size larger than the foot, and made of soft leather.

"When there is a tendency to hereditary malformation, it generally begins to show itself in the toes of one foot, but sometimes of both, from the age of four to seven years. The deformity commences particularly in the first toe, which lies over or under the second, or the upper part of it is confined between the great toe and the second so that when they are all pressed together the middle joint of the first toe is elevated higher than the others. This hereditary development of malformation is very remarkable, and I have had many opportunities of observing it.

"If the malformation is very considerable, it may be advisable at this early age to endeavor to straighten the toes, to effect which I recommend a piece of stiff pasteboard, padded with wadding, covered with silk, and cut to the shape of the under surface of the foot,—to be applied from the waist or hollow of the foot to the tips of the toes, so that they may rest firmly on it. At the end of the pasteboard, holes or slits should be cut on each side of the toe requiring to be compressed, and a piece of narrow ribbon or tape crossed over the toe and passed through the holes, the toe being properly pressed down before the ribbon is secured to the under surface of the pasteboard. A more simple plan consists in the application of a narrow strip of adhesive plaster, turned round the toes which require to be kept in their proper position, passed under the others, then crossed over the instep, under the foot, and brought over again. It must be drawn sufficiently tight to prevent the toes from slipping. The plaster should be changed once a week, or oftener if it does not adhere."

In addition to *washing* the feet, as recommended above, it is quite necessary that *foot-baths* should be resorted to in a great variety of conditions of the feet. Ordinarily the proper time for taking a foot-bath is at night, just before retiring to rest; but under peculiar circumstances, to be mentioned, they may be demanded at other times in the day.

The employment of foot baths, whether hot or cold, must depend greatly on the difference of constitution and habit. For

persons advanced in age, the tepid bath is preferable, particularly if they are subject to gout or rheumatism. Any sudden change of temperature in such cases might do harm, and the feet ought not to be put into water of any kind while the patient is actually suffering from either of those disorders, except by the direction of the medical attendant.

In advanced age persons should not generally bathe the feet; they would, however, derive great comfort from sponging them once or twice a week, or oftener, with soap and warm water, wiping them thoroughly dry immediately afterward, then using the flesh brush or the hand and rubbing off the loose cuticle or scales with a coarse towel. When there is an accumulation between the toes, a fine cloth, wetted with eau de Cologne or any other spirit, may be drawn backward or forward between them two or three times a week.

Adults in good health may bathe their feet every morning with cold water, wipe them thoroughly dry afterward, and then rub eau de Cologne freely over them with the palm of the hand. When dressing for dinner the feet should be washed with soap and water in the same manner as the hands.

When a hot foot bath is required previously to cutting the nails, etc., it should be used in the morning, and made with bran and water, but if the skin is naturally soft and moist, salt may be substituted for the bran. The temperature of the water should be from 90° to 96° Fahrenheit, and the feet should not be kept in the bath more than fifteen minutes. As soon as they have been dried, the callosities, (particularly those about the heel,) and excrescences of all kinds, should be scraped or rubbed off with a coarse towel, pumice stone, a fine rasp, or a dull knife.

When a bath is used medicinally, or in consequence of fatigue, the evening, as already remarked, is the most proper time.

If the skin about the heel is very thick and chapped, it must be rubbed until it becomes smooth, after which a little cold cream or glycerine may be applied. If the fissures extend through the skin, (as is sometimes the case,) after the thickening has been removed, a piece of plaster should be drawn tightly round the heel to keep their sides in apposition.

In clothing the feet, much more care and attention should be

bestowed upon the proper selection of the stockings and shoes than is usually done. Care should be taken that the side seams on the foot of the stocking do not press against the little toe, such being, (from the pressure of the shoe,) one of the common causes of corns, and also productive of severe pain from those already formed.

Ladies, for general use, should wear silk or fine thread stockings, and spun silk in the winter; even when the feet are naturally cold, the usual under stocking will be sufficient for additional warmth. If ladies are liable to swollen feet, particularly about the ankles, support may be obtained by wearing the elastic boots, which will be found exceedingly comfortable, as the ankles will be supported and freed from the usual pressure of lacing, the boots being made with an elastic spring over each ankle yields equally in all parts to the swelling. Walking shoes should be made of kid or dog skin, and for wet weather, of fine French calf, with double soles; if the feet be affected with bunions, the elastic spring let into the centre of the vamp will be found very beneficial, as, while offering support it will yield with the same to the feet as the boots do to the ankles.

Pedestrians, soldiers on a march, and sportsmen who are constantly on their feet, should wear woolen stockings, and change them daily; the shoes should be made right and left, and lace firmly over the instep and round the ankle, so as to prevent the foot from slipping about in them; the soles ought to be considerably thicker than they are usually made, with a full tread, and the waist narrow, the outside not too much twisted but made straight until above the little toe, and then shaped to the foot; the upper leather should be very pliable and soft, lined throughout, (instead of the usual narrow pieces pressing on the toes,) and properly fitted, so as not to have any ridges or uneven surface. If the shoes can be depended on as waterproof they will be preferable.

The foot of the stocking, as far up as the ankle, should be well rubbed over with common yellow soap, to prevent the feet from being chafed or galled. Stockings thus prepared ought to be worn constantly during a march. Several pairs

may be prepared at once so as to have them always in readiness. When the stockings are changed in the evening, of course the clean ones should be worn without soap.

After a day's fatigue, the feet should be kept for ten or fifteen minutes in hot water in which two large handfuls of salt have been previously dissolved; then wiped thoroughly dry and well rubbed with eau de Cologne, brandy, or other spirit.

A celebrated sportsman said that when using the soaped stockings thus prepared, he has seen a lather forced out above his shoes from the heat of his feet, and the continual friction in walking. He also informed me that he has been frequently obliged to change his stockings during the day without catching cold, or suffering any other inconvenience. He never neglected the hot bath in the evening, and always rose quite refreshed the next morning. During the whole of the season his feet were never chafed nor blistered.

I have heard of the feet having been rubbed with tallow previously to a day's walk, for the same purpose, but I can not speak in favor of the plan as I have never met with a person who had given it a trial. The action of the soap upon the skin in keeping it moist and supple can be readily accounted for by the quantity of alkali it contains.

Pedestrians who take immoderate exercise or undertake a walking tour, should wear woolen stockings and shoes with broad thick soles, and take particular care of their feet, washing them every morning with soap and water. If they are accustomed to use cold water, and the feet are tender, they may be sponged or bathed for a short time with water or water in which salt has been dissolved, and then thoroughly dried. In the evening the feet should again be thoroughly washed just before going to bed, and rubbed briskly with a coarse cloth or the hand until they are quite dry, when the person should assume a horizontal position, either in bed or with the feet across a chair, exposing the uncovered feet to the air for some time until all swelling or congestion has subsided, when, if the person purposes to sit a while before retiring, clean stockings should be put on.

If the feet have any bunions or corns, they may be scraped

after the bathing, with a dull knife, or rubbed with some fine sand-paper, until all the dead skin is removed. But a sharp knife, a razor, or other sharp cutting instrument should never be applied to a corn while a person is on a march; as, if the surface is pared off to the quick, the next day's march may fret it and produce serious inflammation.

In marching, if blisters rise on the toes or heel, they should at once be punctured with a needle, passing the needle a little distance under the sound skin so as to produce a valvular opening to prevent the introduction of air as the fluid passes out. If not sooner attended to, all blisters should be opened in the evening after the foot-bath, and the fluid gently pressed out, and then the patient assuming the horizontal position they may not fill up again, and by morning they may be nearly or quite well. Sometimes blisters form on the end of the toes, or on the heel, and the person is not required to resume the march on the following day. In such cases it may be as well to let such blisters remain unopened, and as the water is absorbed and the dead skin becomes dry it should be removed.

It is never safe to wear boots or shoes that are too short when any considerable amount of walking is to be done, as short shoes press upon the end of the toes, particularly the great toes, causing tenderness on the end of the toes and at the root of the nails that may not attract much notice until a serious difficulty has been engendered.

If, on taking off the stockings, there are found any blood-stains, the foot and toes should be carefully examined, but especially the nails, and if there is blood at the root of them, and tenderness, the evidence is positive that the shoe worn has been too short and has pressed against the points of the toes or against the end of the nails. To remedy this accident a piece of lint or cloth should be wet with a solution of the sulphate of zinc and applied around the toe and nail. This will usually be sufficient, provided the wet lint be kept in contact with the toe until all oozing ceases, and all pressure upon the toe is carefully guarded against.

The perspiration of the feet seldom requires medical interference, unless it is either to such an excess as to be annoying,

or the odor becomes so very disagreeable as to be offensive. The latter is a source of exceeding discomfort to many persons who are otherwise in good health. The odor is most perceptible in warm weather or in hot rooms, and in many cases is so fetid that the society of the afflicted person is avoided.

No permanent cure can be expected, but cleanliness is absolutely necessary; changing the stockings frequently, washing the feet with rose water, and rubbing them with scented oils twice a day, is all that can be done. If the perspiration is profuse, an astringent lotion may be used after bathing and before employing the scents. A solution of chloride of lime or sodium may be also used with advantage. And in addition, a thorough cleansing of the whole system by means of a warm water emetic and free catharsis, followed by a wet sheet pack, plain, simple, and rather spare diet, and frequent cold foot-baths, will afford relief.

When the skin breaks into fissures between the toes, the crack extending around and under them, it is caused by an acrid condition of the perspiration, or the want of sufficient ablution. In either case it is easily cured by washing the parts with soap and warm water, and applying a piece of lint or rag wetted with camphorated spirit or tincture of myrrh; or, if there be much moisture, by dusting between the toes every morning with a muslin bag containing hair powder, chalk, starch, or fuller's earth, dried and rubbed into a fine powder, the parts being first well washed and dried.

When the toes adhere together from the pressure of the shoes, a piece of new silver or tissue paper, folded and cut to the shape of the top of the toes, placed as far down between them as it will go, absorbs the perspiration, and frequently prevents the formation of soft corns. It should be changed every day and kept perfectly smooth.

The want of perspiration, with a dry and burning skin, arises more from constitutional disturbance than from local disorder. Dyspeptic and rheumatic persons are particularly liable to it, and suffer more or less as the stomach is deranged. To relieve the harsh hot skin, the feet should be bathed in warm water mixed with oatmeal or bran, and should be frequently rested,

especially after walking; but the greatest benefit will be derived from the restoration of health under judicious medical advice. A foot-bath, containing the bicarbonate of potassa in solution, is frequently very beneficial.

Cold, clammy feet are indicative of debility, and little relief can be obtained from external applications. Camphorated spirit, or any stimulating preparation, well rubbed over the feet will, however, be found extremely serviceable.

If these directions are followed, most of the more common ailments of the feet will be avoided, or if present, can be readily cured. But some of the many diseases the feet are liable to may have already been produced, and somewhat specific directions for the treatment of such diseases may be added with advantage. Among the more troublesome diseases the feet are liable to, and which often incapacitates the sufferer for any but the most painful locomotion, are corns.

Corns are excrescences or thickening of the skin of the toes or the feet, caused and perpetuated by continued pressure, producing hypertrophy of the papillæ of the derma, which hypertrophy is kept up by the irritation induced by the pressure and friction on the affected part. These are often called by the Latin word *Clavus*, a nail, because some varieties of corns present some resemblance to a nail, with a broad head and short sharp point. Corns may be formed on other parts of the body, but usually are located on the toes and feet. Of these troublesome and painful derangements there are several varieties.

Soft Corns are always located between the toes, and being kept moist by the exhalations of the toes they never become hard like the more common ones often found on the top of the joints of the toes. These corns are never deeply seated, and do not project much above the surrounding surface, but the compression that they are constantly subjected to keeps them nearly flat.

They are caused, usually, by the pressure of the joint of an adjacent toe against the one where the corn is formed; or by the little toe being pressed down against the bone of the one next it. They may be formed at any prominence of the *side* of

the toe, where the compression of a shoe with a sole too narrow for the foot has caused much pressure. The condition of the corn and its painfulness depends much upon the position of its location. If the pressure is very great it may produce inflammation that may end in suppuration.

The first indication that a soft corn is being formed, is a sense of burning between the toes as if the part had been scalded. Soon a blister is formed, and the escaping serum irritates the surrounding skin. If the blister does not break, the fluid within it becomes thickened, forms a hard substance, and thus generates the corn. When the fluid escapes, the tender skin inflames, and a new thick series of layers take the place of the cuticle, and thus the corn is produced. When the soft corn is fully formed it produces a sensation as if a gravel or seed was between the toes; and sometimes causes a crack in the skin.

When the corn commences with severe inflammation the skin becomes thickened, and a corn is formed at the point of the greatest pressure. It is circular in form and of a dirty red or yellowish brown color.

If a soft corn is not removed, ulceration often follows, with inflammation of the foot, which inflammation may extend up the leg. This condition is always attended with great pain.

Sometimes a soft corn will be developed in the space between the fourth and the little toe, in the form of a white spongy thickening of the skin. At times it appears as a white spot, or like a split pea, or like a white thickening of the skin rising into a pustule, with a minute opening in the centre. When one forms on the inner side of the great toe and another near the end of the second toe, they are usually broad, flat, tender, and perhaps cover extravasated blood. In elderly persons whose feet are not much moist, the corn is usually flat, and harder than common.

The treatment of soft corns must vary with their location and their condition. The thickened skin may be removed with fine sand-paper, or if the corn is sufficiently developed it should be extracted. The spongy portions of the skin should be removed until the surface looks quite red, when the pain

will cease. It is very important that a piece of folded lint, or of soft sponge should be worn constantly between the toes to keep them apart, and that all pressure should be removed. When the disease has been of long standing, although relief may be afforded from time to time, its complete eradication is exceedingly difficult, as the spongy skin is very liable to become a regular growth. In the worst cases, if there be much inflammation and swelling of the foot, perfect rest is requisite, and the limb should be well and frequently fomented.

When the inner sides of the toes appear inflamed, and the patient complains of much pain, although little is to be seen on examination, cold applications should be made use of, a piece of lint soaked in cold water being placed between the toes and enclosed by a strip of oiled silk passed round them both. This will remove the inflammation, and if there be any latent disease it will become visible by the contraction and swelling of the skin.

It is requisite to caution persons suffering from these complaints to avoid applying violent remedies, such as nitric acid, aromatic vinegar, etc., as they may do themselves serious mischief.

There is another disease affecting these parts of the toes, which, although not absolutely a soft corn, should be noticed here, as it may be mistaken for that complaint by persons who are subject to it. It is a kind of neuralgia seated between the toes, but which fortunately is not very common. It constitutes a most troublesome and severe complaint and one very difficult of removal.

The patient complains of a severe pain between two of the toes, along the inside of one or the other, generally the second or third, he can seldom tell which; it extends up the leg, and is increased when the toes are pressed together, more particularly after walking. Notwithstanding the most careful examination of the part, no obvious cause can be discovered for the pain, and like all similar affections of the nerves there is not any remedy to be depended upon as it appears to defy all medical treatment.

There is, however, sometimes a little redness and swelling

apparent, or perhaps the bones forming the middle joint project in a slight degree, but not so much as to be noticed unless attention be especially drawn to them.

The disease is not permanent, but continues for a time and then either ceases altogether or disappears for a longer or a shorter period. It is in all probability connected with some constitutional derangement. The remedy I have found to be beneficial, is the elevation or depression of one of the toes by mechanical means, to take off pressure from the affected nerve.

Another form of neuralgic affection occasionally attacks the nerve on the sole of the foot, below the third and fourth toes, but nearest to the third. The spot where the pain is experienced can at all times be exactly covered with the finger. The pain, which can not be produced by the mere pressure of the finger, becomes very severe while walking, or whenever the foot is put to the ground.

The complaint appears to me to be very similar to that just described, and I can not assign any cause for its occurrence. Relief can only be afforded by the application of lateral compression, a strip of plaster about an inch wide being drawn tightly over the foot and round the sole. I believe this application acts by drawing the bones closer together, and thus affording protection to the affected nerve, which, when the parts are capable of expansion is more exposed to pressure.

Festered Corns, are met with in cases where the toes have been drawn out of their natural position, so that the joints become very prominent and the skin covering those prominences becomes thin and much stretched. When severe pressure or friction is exerted on these projecting points a very painful and troublesome corn is produced.

The first appearance of this complaint is indicated by redness of the skin over the joint, and the whole toe being sensitive to the least pressure; as the disease proceeds, the skin becomes slightly thickened, semi-transparent, and less laminated than in any other species of corns.

In some cases inflammation supervenes and matter forms under the whole extent of its circumference.

As the inflammation increases, a corn is fully developed

ordinary thickening is produced, and consequently a more intense inflammation is caused, so that the whole of the portion of true skin subject to compression participates, and its vascular structure, together with the nervous fibers, become enlarged, and to such an extent that when the inflammation has been partly subdued by the removal of the shoe, by poultices, or by any other means which have been employed by the patient himself, the enlarged structures do not return to their normal condition, but constitute a net-work within whose meshes is deposited the adventitious matter produced by the thickening of the skin that is continually going on, and which, becoming condensed forms the small corns situated between the nervous fibers.

By the time the inflammatory action has entirely ceased the nervous filaments are completely matted, as it were, within the outer skin.

Persons seldom apply for professional assistance in the acute stage of the complaint, for, when first attacked, the pain indicates the necessity of removing the pressure, and the inflammation is generally allayed by poultices or some simple application, which give relief for a time but do not remove the corn. When the same kind of shoe is again attempted to be worn the severity of the pain produced obliges the sufferer to seek professional assistance.

This is the species of corn which, when cut unskillfully, or improperly treated, in persons of inflammatory constitution, and particularly in aged people, has been productive of very serious consequences and even in some instances of death from the resulting mortification. This latter termination occurs more especially with persons advanced in life in whom the lower extremities have already less vitality than other parts of the enfeebled frame, and consequently are unable to resist the effects of the additional irritation caused by an unskillful operation.

The first treatment should be by palliative remedies, particularly during the inflammatory state; the application of lint dipped in cold water, and covered with oiled silk or gutta-percha, together with rest, and the avoidance of all pressure, will generally be found sufficient for the purpose.

When the irritation has ceased the thickened skin may be carefully removed without giving much pain if the nervous fibers are not touched by the instrument, after which soap plaster may be applied, at the same time guarding the projecting point from the pressure of the shoe by mechanical means.

In the chronic form, which is always unattended with inflammation but where the skin is much thickened, it should be scraped off until the white lines and intermediate specks are visible. The corns should then be carefully picked out from between the filaments, great care being taken in the operation to avoid prickling them or producing hemorrhage, as that would be attended with excruciating pain and might cause great irritation and inflammation; the wetted lint should be afterward applied for a few days or until the soreness and pain cease, and then a small piece of soap cerate plaster should be placed over the corn and worn continually.

With the usual caution against pressure perfect relief will thus be obtained. Although a radical cure can not be insured, relief will certainly be given, and in many cases the nervous filaments will disappear, leaving a slight thickening. This however, seldom causes any pain.

Vascular Corns are not very common; but a very painful vascular excrecence is occasionally met with, situated on the soles of the feet, upon the plantar muscle, or under side of the heel; also on the little toe, and sometimes on the sides of the great toe close under the nail. It is easily distinguished from a common corn, as it has more the appearance and character of a wart, but can not be so considered, as warts come principally on the hands and fingers, and on parts where there is no pressure; are seldom painful, and grow without any apparent cause: but this excrecence is always painful, and is never produced without previous pressure.

This disease is a deep-seated, spongy, or vascular substance, forming a circumscribed tumor, not projecting much beyond the level of the thickened skin; when fully developed the whole of the surface is studded with red and black specks, and the surrounding integuments inflamed and swollen.

In some cases the minute extravasations are not distinctly

defined; the excrescence then appears as a softened tuft, the vascular fibers composing which seem to be of unequal length. When an attempt at extirpation is made with the knife, hemorrhage to a considerable extent immediately follows, all the minute vessels pouring forth their contents very profusely.

This disease has been noticed as connected with a cancerous diathesis, but I am convinced that there is nothing malignant in its character, never having met with a case which did not yield to the application of nitrate of silver, and in which an effectual cure was not obtained in a very short time; it is likewise satisfactory to know that the disease never returns.

In the generality of cases the patients are young and have what is usually called fleshy feet, moist and clammy tissues, and the skin thin. It is seldom met with in children under ten years of age, nor in aged persons. Women are less liable to it than men.

The principal symptoms are a burning sensation in the part affected, which is very sensitive to the touch, attended with aching and throbbing pain, particularly after walking when the shoe has been removed, and on lifting the foot from the ground. I have never been able to ascertain satisfactorily the cause of this complaint, none of the patients recollecting any previous indication before the pain became so intense as to require medical aid. Some persons have observed the skin to be somewhat thickened on the part, but did not experience any pain or inconvenience.

The general treatment is simple, and requires but perseverance in the use of the nitrate of silver to effect a radical cure. The excrescence should be incised superficially before each application.

Laminated Corns are those in which the laminæ of the epidermis, which are discoverable in all forms of corns, are particularly apparent. The laminæ are often confounded, in part, into an apparent homogeneous thickening of the epidermis; but in some forms of corns the various laminæ are very distinct from each other, the different strata, being, sometimes of different colors as light or dark brown or black. This form of corns, or rather the different colors of the laminæ, are produced by an

effusion of serum or of blood under the epidermis or among epidermal cells which was not absorbed; the ecchymosis carried toward the surface by the formation of new tissue changes color, and fades, or remains quite dark.

Fibrous Corns are produced by a continuous pressure upon a prominent portion of a common or hard corn, until the pressure has caused absorption of the papillæ, and a part of the structure of the derma, and, perhaps, injured the structure under the skin by the continued pressure, at last producing a conical shaped depression of greater or less depth. The skin is much thinner under the corn, the papillæ are removed by absorption, becomes horny, and of a darker color than the surrounding parts. Of course, as the edges of the layers of thickened epidermis rise up when their central parts become depressed, they give to the corn the appearance of being composed of fibers. This form of corn never presents itself until the disease has been of long standing,

Hard Corns, may be laminated, so as to belong to that division of corns, or present the condition of hardness alone as their characteristic. Hard corns are by far the most common variety, and some surgeons have appeared to recognise but two varieties, hard, and soft. Hard corns are much more common than any other variety, and they alone are often recognised by those who give directions for the extirpation of these diseases.

All forms of corns, in their formation, commence with an enlargement of the papillæ of the dermis, increased vascularity, and an increased production of epidermis, which, by becoming accumulated or thickened, constitutes the *corn*.

The *Treatment* of corns, as has been shown, must vary with the nature and seat of the disease, and may be intended simply to give relief, or may be designed to produce a radical cure. For the purpose of easing the patient for the time, and, perhaps, also of producing a radical cure, various means may be resorted to in order to remove all pressure from the seat of the disease; and the thickened epidermis must be removed from time to time as it accumulates. Pressure and friction on the seat of the disease must be avoided by disusing any form of shoe or boot that is found to be hurtful, or by surrounding the corn with sponge,

with the central portion of the sponge, over the corn, cut out, or thick soft buckskin or other leather prepared in the same manner; or, what is still preferable, a piece of amadou, which may be saturated with any desired wash. Any soft substance that is thick enough to receive all the pressure and friction that the corn would otherwise receive, will do, but certainly amadou, properly cut, is the most excellent article to apply around a corn for that purpose. The utmost cleanliness is requisite whatever be the mode of treatment adopted.

The thickened epidermis may be removed by scraping, filing, rasping with fine sand-paper, or cutting. It has been recommended that the epidermis be removed by means of various alkaline caustics; but all forms of plaster, paste, or wash, that have been applied for the purpose of removing corns are attended with danger, except, perhaps, the application of *acetic acid*. When the corn is very soft and tender, the solid nitrate of silver may be applied to its surface to harden it and lessen its tenderness so that a file or knife may be used without pain. When a corn is very hard and horny, a warm alkaline solution, not very strong, may be applied to soften it before the corn is taken out completely.

Extirpation of corns, by the chiropedists, is usually effected by a careful process of cutting and tearing out the central portion of the corn, while the circumference of the diseased part is left to serve the purpose of taking off pressure from the more tender portion at the seat of the disease. Some of these peripatetic operators make use of the tincture of iodine or some other substance that will produce a stain of the surface, under pretense of using some secret means to deaden the sensibility of the parts, but such washes do no good. A continued use of some solution of iodine, with the removal of all pressure, will, in time, cure some corns, and especially the softer ones, but acetic acid of the proper strength is preferable.

The only sure and complete cure for a corn is its complete removal, and the wandering chiropedists either have not skill or have not patience sufficient to produce this result, and hence seldom or never produce a radical cure. After a *hard* corn has been extirpated, acetic acid, or a solution of iodine should be

applied to the part, until all remains of the disease have disappeared. Even then, if pressure is allowed a new corn is quite liable to occupy the seat of the old one.

Soft corns can be removed by the file, the sand paper, the knife, or better still in many cases, by the scissors. All of the thickened epidermis must be removed, and future corns prevented by very close attention to cleanliness and by placing a pledge of cotton about the seat of the corn each time after the feet are washed. Whenever a sinus forms under a corn, or whenever the pressure of the corn produces suppuration, either with or without the formation of a bursa between the corn and the bone, the corn should be removed, and then the point of a stick dipped in strong nitric acid should be applied in the sinus or over the suppurating surface so as to change its condition and allow the formation of granulations. If the bursa or suppurating surface is near the bone, the acid must be applied with great care and caution.

When corns form under the nail it is sometimes absolutely necessary to remove a part or the whole of the nail that it may no longer press on the corn underneath. Then the corn can be treated as those which are situated elsewhere.

Popular Remedies for Corns. Soft corns have frequently been treated by binding upon them a leaf of ivy previously well saturated with strong vinegar, the leaf to be changed night and morning. A piece of lint soaked with a lotion composed of one ounce of muriate of ammonia dissolved in four fluid ounces of water applied to the corn, and often renewed, has proved serviceable. A powder composed of:—

Savine leaves, 3ij.
Verdigris, 3j.
Red Precipitate, 3ss.

Pulverized, mixed, and applied by being bound on with a damp rag and left in contact with the corn until morning, has been a popular secret remedy. So has a plaster composed of:—

White Diachylon,
Yellow Wax, aa 3ij.

This plaster has been spread on paper or thin cloth or leather, and a small piece applied directly over the corn.

Sir Humphrey Davy's corn solvent was composed of two

parts of potassa, and one part of what he called salt sorrel. These were reduced to a fine powder, mixed, and then a very small quantity applied, with a bandage, to the corn each night for five or six nights.

But none of these popular remedies are equal in value to strong acetic acid, and even that is not equal to extirpation when the operation is skillfully and carefully performed. When corns appear on the toes or the projecting joints of children under seven or eight years of age, they can frequently be picked out by the nurse just after the feet have been bathed, which should be done at once as soon as they are discovered. If the corn returns soon or gives much uneasiness, it should at once be submitted to a competent practitioner.

Sometimes sinuses are formed under corns, especially where the corn is located over a bone, and the skin and parts surrounding the sinus are very much thickened, while the surface of the sinus is pale and without granulations. These sinuses, probably, are the result of the suppuration of a bursa under the corn, which bursa, unable to form granulations, has produced the fistula. Such bursæ form under large corns when they are situated on the ball of the great toe, or under the metacarpal joint of the little toe, on the side of the feet, or under the heel.

To cure the sinuses they must be enlarged and the entire lining of the cavity must be destroyed by means of strong nitric acid on the point of a piece of wood, care being taken not to injure a bone or joint that may be beneath the corn. If the periosteum has already ulcerated away the acid may be applied to the surface of the bone. The application should be repeated daily until the surface commences to granulate.

The Toe-Nails.—The nails of the toes are placed over their extremities to cover them and protect them from injury, and shield the sensitive nerves of touch that abound in that part of the system. Owing to their office and situation, the toe-nails are liable to many accidental injuries. Their peculiar structure renders them capable of being curved or bent under the influence of heat, of moisture, or pressure; especially if not properly trimmed, by the pressure of the shoe or boot they may be compressed into various shapes, the same as *horn* is compressed

when heat and pressure are combined to produce the shape desired.

In some persons a spongy substance forms under the edge of the great toe nails, unattended with pain; it adheres to the nail itself, and is an exuberant growth from the secreting surface beneath. It is easily picked out, leaving a hollow between the nail and skin, in size according to the quantity removed.

This increased secretion appears to be thrown out for the protection of the sensitive parts beneath, and ought not to be removed, unless, by being concreted under the edge of the nail, it causes pressure and consequently pain. It is softer on the inner side of the nail, particularly if covered by the first toe; it is then of the consistence of pomatum, and causes a permanent stain on the nail.

There is frequently a peculiar spongy substance under and about the centre of deformed nails, of honeycomb appearance, very different from that just described, from which oozes a disagreeable ichorous discharge, loosening the nail as far as the disease extends. It is not very painful unless the nail is lifted up by sticking to the stocking, but requires to be attended to as it is sometimes followed by ulceration. The cause is difficult to ascertain, as persons are generally not aware of having met with any accident by which the complaint could have been produced. By cutting away the loose nail and desiccating the part with nitrate of silver, the oozing soon ceases and the toe gets well.

A very severe accident occasionally arises from persons scraping the centre of the great toe nail with the idea that it will grow thicker where it has been scraped and thinner at the sides, so as to prevent its growing in. This, however, is an erroneous practice, and, by continuing this method upon the same place, the nail will become broken with irregular edges which press against and inflame the parts; the irritation soon produces a fungus, which rises through the opening and is exceedingly painful.

When the toe nail has been scraped, and as sometimes happens, the thinned nail has become broken, the toe may be made very sensitive and severely painful, the splinters of the nail

pressing down upon and into the flesh, causing irritation and fungus growths.

When this accident is present it is necessary to destroy the fungus with the nitrate of silver, subdue the irritation with stupes or lotions, and carefully remove the spiculae of the nail or even the entire nail so far towards the root as to include the whole of the injured portion. This is often a slow, painful, and tedious condition to treat, and the toe from which a part of the nail has been removed must be protected with strips of adhesive plaster until the nail has grown again to its natural dimensions. The usual time for the growth of a new nail is from four to six months, much depending upon the healthy state of the secretions.

At times the sides of the nail will curve inward without any thickening, so as to inclose the flesh; it is not painful unless when pressed upon, and only requires the nail to be kept closely cut. I have seen a case, however, where the curvature extended nearly to the centre of the toe; it was exceedingly painful, for which I could not account until I removed the upper part of the nail, when a corn was discovered beneath it which had not been visible externally. Immediate relief was afforded by its extraction, but when the nail grew again it resumed its curved form.

A trifling complaint often happens to the outer side of the great toe nail by the splitting of a longitudinal fiber, or thin edge from the top to very near the root: it does not cause any pain, unless it becomes entangled in the stocking so as to be torn farther down into the quick. The piece must not be pulled out, but should be carefully separated from the skin by first wetting the part with water and then dissecting it out with a small cutting instrument, taking care not to wound the flesh.

In cases of accidents from violent collision of the toe against a stone or any other hard substance, extravasation will immediately follow the blow and be attended with great pain; if the injury is very severe the nail becomes loosened and falls off, and a new and perfect nail will again be produced. If the whole of the nail is not detached, and the loosened part requires to be cut away, it frequently follows that a deformity is

the result, particularly if the injury extends to the semilunar fold. Immoderate exercise will likewise cause the nails to fall off without any apparent local disease excepting an uneasy sensation in the toe around the insertion of the nail together with a slight degree of swelling and redness.

The most severe and painful injuries to which the great toe nails are liable, is that caused by the fall of a heavy weight, or from the tread of a horse. The soft parts of the toe are generally very much bruised and inflamed; and the extravasation commonly extends to the secreting vessels at the root of the nail so that a larger or smaller number of the layers of which the nail is composed lose their adhesion to the root and become incapable of assisting in its further nourishment.

When the inflammation has subsided, the nail which has been injured very much soon falls off, leaving the part covered and protected only by a new skin. The vital force, however, endeavors to supply a new nail; but as the secreting glands at the root have also suffered from the accident their power is greatly diminished and an imperfect nail is the result.

The peculiar shape is produced by the projecting or overlapping of the thickened scales upon each other, commencing with that which is growing at the root of the nail whence the nourishment is derived, each new scale thrusting forward the one previously formed.

When the nail does not extend to the end of the toe, a very thick yellowish cuticular substance supplies its place. After this state has existed for several years it becomes dry and brittle as if it contained a large proportion of the earthy prosphates.

I have known some persons who have shed their nails periodically without suffering any inconvenience, and being, in fact, scarcely aware of it at the time of the occurrence.

Sometimes in putting on a tight boot the stocking is drawn up at the heel, by which the tops of the nails are compressed downwards, producing severe pain, and, if long continued it may cause them to fall off.

Ingrowing Toe Nail.—The most formidable disease connected with the toe nail is that which is called "the nail growing into

the flesh." It is met with most frequently in the great toe, but all the other toes are liable to the same complaint, but less severely. It is caused by an improper manner of cutting the nails, or by the flap of flesh being forced up against the edge of the nail from wearing shoes too narrow or badly made across the toes, or from the edge of the nail being curved or taking some other vicious direction.

Persons when they first feel pain in the sides of the toe are apt to regard it as caused by the nail having been allowed to grow to too great a length, and accordingly commence cutting it, thence deriving temporary relief. In consequence of the pressure of the shoe, which is still continued, the flap is forced more against the remaining rough edge in walking than before, and there is consequently more pain and uneasiness experienced, but lower down nearer the root. The flap thickens, is pushed upward still farther and partially covers the nail, which, as the pain continues, is again and again cut until the scissors can no longer reach the part which is supposed to cause the suffering. The consequence is, that a point is left which penetrates the flesh, keeps up and increases the previously existing irritation, produces severe pain and ulceration, and, if neglected, fungus sprouts forth from the part most affected.

In other cases the nail forms such a decided curve under the flap that its edge along the whole length of the toe is embedded in the soft parts, which become inflamed and so much swollen that not above one half of the nail can be seen. Walking will increase the inflammation, and ulceration will take place in the whole length of the furrow. Under improper treatment or neglect this will continue with many persons for months until the whole is covered with fungus or what is denominated proud flesh. The pain will then be so severe that the weight of the body cannot be sustained upon the toe, and the patient is compelled to rest the limb.

Of the preventive or palliative measures I shall only notice those which have been most commonly in use, or have been recommended from their peculiarity. Cutting a notch in the upper surface of the nail, and scraping the centre with a knife or a piece of glass, are among of the most ancient operations that

have been employed ; cotton or lint has also been pushed under the edges of the nail for the purpose of raising the corners; and then followed the use of tinfoil or silver plate, with the same intention of preventing the nail penetrating into the flesh. Another plan was recommended a few years since, which consisted in scraping the nail very thin along its upper surface, and afterward applying a square piece of cork on the part and retaining it there with a bandage tightly applied, so as, by the pressure on the centre to elevate the sides of the nail.

These mechanical means have seldom succeeded, because the substance placed under the nail is pressed by the thickened curvature more severely upon the flesh, and, consequently, can seldom be borne for any length of time. Another objection applies to the method last alluded to, because no common shoe will admit the foot with the cork and bandage.

The most general application used by the profession for this disease, (without having recourse to instruments,) is nitrate of silver freely and repeatedly rubbed between the nail and flap with the intention of destroying both. This sometimes succeeds when the disease does not arise from a point or sharp edge of the nail penetrating into and irritating the flesh, and the ulceration is not very extensive.

I have seen a case, however, where this plan of treatment was pursued to such an extent that a piece of caustic was absolutely laid in between the nail and the flap of skin, its corrosive action exciting very violent irritation and constitutional derangement, without being of any benefit, so that after the incidental inflammation had been removed by appropriate treatment the excision of the nail was requisite.

When the nail has penetrated into the flesh and ulceration has commenced, these palliative measures prove of but little service even when practiced before the appearance of proud flesh, and relief can only be obtained by the excision of the diseased part of the nail.

“Surgical operations,” some one has said, “are the reproach of surgery.” And although this epigrammatic saying, literally interpreted, would do great injustice to a noble art, yet it would be well for humanity if it were possible in some instances to

change the reproach which attaches or should attach among the initiated, to bad science, to a popular stigma upon the surgeon. This, however, is rarely the case, for it is next to impossible for the public rightly to appreciate all the considerations which must enter into the question of justifiableness or the contrary of any given surgical operation. Not that I would for a moment cast a reflection upon the honorable, high-minded, judicious surgeon, who conscientiously feels the great responsibility which he assumes in undertaking a capital operation. It is a responsibility which often raises the operator to the rank of a hero, albeit but a small number can properly estimate his claim to such a distinction. All honor to those, and they are not few, who have been and are willing, in desperate cases, to take on themselves the heavy charge of imperilling the life of the patient for the uncertain chance of removing what threatens it more distantly, or makes its present burden heavy. Nevertheless, few will deny that every discovery which substitutes a comparatively mild and painless remedy for a painful, even if not positively dangerous surgical operation, confers a great blessing on mankind. Thoughts like these have come into my mind from time to time in connection with the seemingly small but exquisitely painful operation of extraction of an ingrowing toe nail. I know it is regarded as one of the most trifling of operations, but under the circumstances for which it is performed it certainly is to most patients a very formidable one. I have been glad, therefore, to see within a few years various methods of treatment recommended, by which the painful alternative of evulsion may, as I have reason to believe, be successfully avoided. M. Wahu, Principal Physician of the Military Hospital at Nice, reports the successful treatment of this affection in his own person without an operation. He prefaces his account by some reflections on the nature of the operation by extraction. It has always been his theory, he says, and a theory based on personal experience, often repeated, of very severe pain, that every man has within himself the power of endurance to meet any amount of physical suffering which may fall to his lot. Satisfied of his own ability to justify this theory on many trying occasions, he yet confesses that it was not without horror that

he contemplated the possibility of the necessity of a resort to this operation as the only cure for an *ongle encarné* from which he had suffered for a long time. He therefore tried many expedients, hoping to avert the dreaded operation. At last, after an ineffectual trial of alum, and Vienna paste, M. Wahu says:—

“Finally, one day, provoked at being so disabled by a trifle, which, in spite of all my force of will, prevented my walking, I examined again for the twentieth time the seat of the disease, and was struck with the idea that if I could dry up or even tan the diseased surface, so that the ulcer might be converted into a firm surface capable of resisting the cutting action of the edge of the nail, I might obtain a complete cicatrization and consequently a cure. Running over in my mind the most energetic tanning substances, I decided on employing the *perchlorure de fer*, (*perchloride of iron*.) I obtained some in a powdered form, and insinuated it as deeply as possible between the free edge of the nail and the ulcer. I felt almost immediately a moderate sensation of pain, accompanied by a feeling of constriction and a strong burning sensation. A quarter of an hour after I attempted to walk, and, to my great satisfaction, I found I could bear my weight on my foot throughout its entire length without the least pain; a thing which I had not done before for many months. The following day I carefully examined the diseased parts and found them mummified and as hard as wood. I applied a fresh quantity of perchlorure de fer, which I allowed to remain for a quarter of an hour, but I have reason to believe this application was useless, as the mummification was complete by the first process. I continued to walk without the least thought of my *ongle encarné*, and about three weeks after was able, by means of a pediluvium, to remove the hardened layer of skin, under which I found a tissue of new formation which perfectly resisted the pressure of the edge of the nail. Shortly after the whole had returned to its normal condition, and since more than two years have passed without a return of the disorder.”

It may be thought I have taken up a great deal of space for a mere trifle. An ingrowing nail is certainly not so formidable an object to contemplate as many that come under the eye of

the surgeon, but it certainly is no trifle. An old nursery rhyme, "For want of a nail the shoe was lost, for want of a shoe the horse was lost," etc., aptly illustrates its importance. This small affection, as it seems, is considered good ground for rejecting a recruit who offers for the army; and certainly in active service its occurrence might be as fatal to the unfortunate possessor as the loss of its iron representative in the doggerel above quoted was to the owner of the horse. If it can be cured so easily without an operation, it at once becomes an unimportant malady and need not exclude many an otherwise able-bodied man from the service of his country; and should it occur while in service, the detention of several weeks in hospital after the operation of evulsion is avoided. There is another consideration of no trifling importance urged by M. Wahu, namely, that as no one now-a-days would think of performing the operation without using anaesthetics, the danger of employing these agents is averted. In Europe, where chloroform is almost the only anaesthetic used, this is by no means an unimportant consideration, and M. Wahu refers to a fatal case of its employment on the occasion of this very operation.

I would add, in conclusion, that I see no reason why the solution of the perchloride, in which condition this salt is best known here, may not be as effectual a remedy as the salt in a solid form.

If this painful affection can be cured without resorting to an operation, as taught by M. Wahu, a very great advance has been made, for many of the operations resorted to are very painful, few have done more than afford temporary relief, and some have even increased the evil. Dr. Zeis, who has seen many patients operated on by Dupuytren's method of extracting the nail, or a portion of it, states that in every case it was ineffectual. The new methods of operation proposed in the medical periodicals are but modifications of the older ones. Neret directs that a spatula be forced down under the nail to its roots and then the nail torn out. Larrey directs that only about one third of the nail be removed after it has been slit longitudinally. Baudens removes the whole of the depressed edge, together with the surrounding spongy flesh. Others have

directed that the nail be destroyed with the caustics, as potassa, lime, and burnt alum. Donzel dissected the skin from the *root* of the nail, filled the fresh wound with lint, and the next day applied a caustic paste to destroy the root of the nail.

As the operation has always been painful and frequently ineffectual, surgeons have endeavored to lift the entire edge from its bed away from the inflamed parts, and then repress the granulations and heal the toe. A part of the central portion of the nail has been cut out. The middle portion has been scraped thin and flexible; or, after making the nail thin it has been burned with caustic to cause the nail to shrivel up,—but this usually causes the destruction of the entire nail.

Whatever method is adopted, attention should be paid to the general health of the patient, and, as soon as the point of the nail can be elevated a small piece of lint should be placed under the elevated portion, and kept in place by covering the end of the toe with adhesive plaster. The toe should be bathed often with warm water and new lint applied after each bath. If the ulcer be of considerable size, and, especially if there be an offensive discharge from it, it should be sprinkled with fresh powdered charcoal after the lint is applied and before the adhesive straps are put on. Dr. Alcantara places some ointment of the perchloride of iron on the lint that he crowds under the nail, which is a decided addition to the treatment of M. Wahu.

By cautious, judicious, and persistent attention to these painful affections, even the most unpromising cases can be restored to complete and perfect health.

Onychia is a form of disease that attacks the nails of both the lower and the upper extremities. It is essentially an inflammation of the *matrix* of the nail, and may not extend beyond the matrix, or it may and usually does extend so as to involve the adjacent soft parts.

This inflammation may be caused by an external injury, as a bruise, by a pressure upon the end of the nail from a short shoe or boot, by a foreign body passed under the nail, as a splinter, or by some constitutional derangement, as syphilis, scrofula, or eczema. It may be confined to one toe, or if the cause be constitutional, several toes may be affected at the

same time. The amount of inflammation may be slight, or so extensive as to produce suppuration, ulceration, fungus granulations, with ichorous, sanious, or fetid discharges, with loss of part or the whole of the nail, and loss of one or more bones of the toe. This disease is always troublesome, painful, and difficult to manage.

When onychia is the result of external injury, the injury should be treated according to the nature of the accident. If pus forms beneath the nail it must be scraped thin and an opening made in it through which the pus may escape. If a foreign body has found lodgment under the nail that must be removed. If the disease has been caused by pressure on the end of the nail that pressure must be removed and the patient kept quiet in the horizontal position, and the toe treated as for *Ingrowing Nail*.

If onychia is caused by eczema it is accompanied with eczematous eruptions on other parts of the body, and becomes well as the general disease is cured.

When onychia is caused by a scrofulous taint of the system, it usually commences at the nail follicle, while the inflammation extends to all the parts bordering on the nail. This form of onychia is seldom observed on the toes, but is not seldom met with on the fingers.

Syphilitic onychia like that form of the disease accompanying scrofula, is not often observed on the toes, and is almost always accompanied with syphilitic eruptions on other parts of the body. In syphilitic onychia the matrix of the nail frequently turns red, swells, suppurates, and ulcerates. The skin around the nail becomes puffed and swollen, and the entire extremity of the toe becomes enlarged, while the suppuration, ulceration, and fungus growths at the edge of the nail increase so as to partly overlap the nail and give the toe an appearance as of the ordinary ingrowing nail. The nail may at the same time become discolored, brittle, altered in thickness, rough, and even fall off.

As the general disease is cured the local affection disappears or readily yields to the usual treatment.

Onychia sometimes assumes a malignant form with very

great pain from the first, and destruction of the periosteum and disease and perhaps death of the bone, without any apparent cause either local or constitutional; but this condition must be the result of some mal-assimilation, or other bad condition of the part at least. When onychia is produced from ingrowing of the nail that condition must be cured, or the resultant disease will still continue to be present.

When the discharges are fetid, the chloride of lime, or alum, in solution, will always be useful, and the toe should be washed often with one or the other. The muriated tincture of iron properly diluted will also be found of great value. The general treatment of the affected part recommended for ingrowing nail will be applicable in this form of disease.

When onychia is the result of some derangement of the general system, such constitutional treatment as will overcome the original malady must be prescribed. In fact, as already indicated, the constitutional treatment is of more importance than local applications. In eczematous onychia the benzoated oxide of zinc ointment is highly recommended by Wilson and others. When a scrofulous condition of the system causes the disease, that general disease should be overcome by appropriate treatment, and the local disease subdued by cooling applications and quiet. Syphilitic onychia will almost immediately disappear as the general disease is subdued. The malignant form of the disease will require tonics and supporting general treatment, with such local applications as other forms of severe disease of the tissues demand. Even amputation of the toe may be required.

Bunions.—The word bunion, which has been indiscriminately applied by the public to any hard and painful tumor or corn on the feet, should be restricted in its use to designate an enlargement over the first joint of the great or little toe, produced by pressure or by some other cause effecting a change in the position of the joint.

One of the most frequent and certain causes of a bunion is the wearing of shoes made too short, and with a narrow sole, so that the feet are subjected to an undue degree of pressure both laterally and longitudinally, and the whole weight of the body is thrown upon the articulation of the bones of the feet with the

great and little toes, there not being sufficient room for the foot to expand nor for the great toe to extend itself, so that the motions of the joint and the regular action of the muscles are impeded, whereby excruciating pain is produced, followed by inflammation, malposition of the great toe, and the ultimate formation of a severe bunion.

When a bunion is produced by distortion or hereditary malformation, the great toe, which should be in a straight line with the foot, lies transversely over or under the next toe, causing a projection of the joint, which is subjected to continual pressure on the most prominent parts, gradually increasing in severity as the swelling enlarges until a bunion is fully developed.

Constitutional derangement, producing a relaxation of the system, may also act as an occasional cause of bunion in persons predisposed to that complaint, by inducing a feebleness in the joints, principally of the great toe, with pain after walking, which frequently continues after the shoes have been removed and the feet are at rest. This cause is influenced by a peculiar state of atmospheric temperature affecting the feet in particular constitutions.

Among the more common constitutional disturbances that lead to the formation of bunions, rheumatism and gout must take precedence. They affect the synovial tissues and the tendons, and thus not infrequently distort the toes, or lead the great toe especially to point obliquely across the others so as to bring the articulation out prominently against the shoe, producing pressure upon it, and causing inflammation of the joint and the formation of a genuine bunion.

As persons advance in years the synovial membranes of the joints that have been much used become worn and secrete less than the ordinary amount of fluid, causing the joints to become stiff and painful on motion, or even partially ankylosed. The same condition follows chronic rheumatism in both the young and the aged. This stiffness when manifested in the joint of the great toe is sometimes mistaken for a bunion, but it cannot be so considered, as it neither closely resembles a bunion nor can be cured by treatment adapted to the cure of bunions.

A bunion consists of an enlargement or thickening of the

common integuments over the first joint of the great toe, seldom affecting both feet at the same time; caused either by compression or by an unnatural obliquity of the great toe outward, by which the position of the joint between it and the metatarsal bone is changed. When the disease is first noticed it is attended with trifling pain and inconvenience, but from the continued and increasing pressure and the non-removal of the cause that originally produced it, inflammation is set up, the skin covering the joint becomes involved, thickens in layers or scales over a considerable surface, and is studded with clusters of small superficial corns.

If the disease in this advanced stage be neglected or improperly treated, or if the patient take an unusual amount of exercise with a more than ordinarily tight shoe, the inflammatory action will be renewed or increased, the bursa beneath will become enlarged between the skin and the bone, and fluid will be effused, causing considerable swelling over the articulation, attended with exquisite pain and tenderness, which will be felt, not only in the joint, but also extending to all the surrounding parts.

If the disease still proceeds, the pain and swelling continues to increase, and suppuration may take place within the cavity of the bursa, which, on account of the depth of its situation and the abnormal thickening of the integuments, is very slow in bursting externally. Sometimes the ichorous fluid burrows into the adjoining cellular tissue, producing ulceration, and in some cases causing caries of the bones, and not unfrequently exfoliation of the joint.

A protuberance is occasionally met with on the corresponding joint of the little toe, and may be regarded as a species of bunion, which, from its position, is not subjected to the same amount of pressure in walking, but the pain and inconvenience otherwise are not less severe than in ordinary cases in which the joint of the great toe is affected. The symptoms and appearances are precisely the same, but in the worst cases, although attended with great irritation, the inflammation rarely does much mischief or extends further than the bursa; and it is more amenable to the proper treatment.

When this tumor is caused by the little toe being forced obliquely out of its position and under the next, it will sometimes enlarge to so great an extent as to project considerably; the skin will be thickened without inflammation and also without pain except when pressed upon. The chief complaint in this case arises from the unsightliness of the joint. These distortions of the joints can usually be cured by placing between the toes flexible sheets of lead, not too thin, so as to keep the toes nearly in their natural position.

Persons of a sensitive nature and delicate health sometimes suffer exceedingly from pain in the joints, even when the enlargement is inconsiderable or even not perceptible, and where neither inflammation nor any other form of disease can be discovered on examination. The skin is very tender to the touch, soft, moist, and clammy. This condition, which may be the incipient stage of a bunion, can usually be readily relieved by an anodyne lotion, to be used almost constantly for a few days, and then the joint and the foot closely bound with one or two thicknesses of a roller saturated with an infusion or tincture of belladonna and arnica combined.

A small tumor frequently forms on the instep of the foot of those who wear a boot that is too tight at that point. This tumor is sometimes described as a bunion, to which, however, it has but little resemblance. The tumor is situated *under* the skin,—is hard and immovable. When the pressure is removed and the inflammation has subsided the skin is sometimes found to be thickened, and a small but sensitive *corn* has been formed.

When tumors about the toe joint have been produced by gout or rheumatism, very loose shoes should be worn, and the foot and general system treated for the existing disease. Shoes or boots of buckskin, of felt, or of flannel, even if quite loose, may still produce painful pressure. This form of disease may be of long continuance, while bunions, even when very painful, appear to be more under the influence of treatment.

Although a radical cure of a perfectly formed bunion can seldom be insured, yet in most cases, if not in all, relief from the pain and other inconveniences may be afforded by proper treatment. The time required for this purpose will vary very

much; in many cases palliatives must be used for a length of time before a cure is effected, and even then the enlargement of the joint does not entirely disappear. In all cases it is advisable not to have recourse to violent modes of treatment, more especially when the bursa is inflamed, as very serious consequences have been known to ensue.

The most beneficial and proper local remedies are cold water dressings, spirit lotions, and the application of diachylon and soap plasters; in the more severe cases, linseed meal poultices made with decoction of poppies; or the nitrate of silver, potassa fusa, and also nitric acid; but these latter remedies must be employed with the greatest caution.

When a bunion first forms it appears inflamed but is not attended with much swelling; the pain in the joint is mostly felt when the shoe is worn; it continues for a few days and then subsides, re-occurring, however, at intervals for many months, without increasing in severity so as to require medical advice. If it be caused by wearing a short, or badly-made shoe, it will be immediately relieved by removing it, and a cure effected by bathing the foot night and morning with a spirit lotion.

Even if the shoe should not appear afterward to press injuriously on the foot it ought not again to be worn, for if the patient persist in doing so the pain and irritation will gradually increase in proportion as the foot is used, and be felt more especially in the joint under the ball and along the toe. Inflammation will extend and proceed over the instep, the integuments covering the joint will be thickened, the skin will form in scales or layers, and corns be generated either on one elevated point or else in small superficial clusters on various parts of the bunion.

The best mode of treatment in such a case is to reduce the inflammation by rest and by the application of cold lotions, after which the corns may be carefully extracted, and a plaster made with soap-cerate and adhesive plaster applied over the joint. If the great toe is inclined obliquely inward toward the others, a piece of sponge, or a pledge made with tape or linen of sufficient thickness, should be placed between the

great toe and the one next to it so as to bring it in its natural position parallel with the other toes and with the bones of the foot. By thus carrying the end of the toe out where it naturally belongs and removing all pressure from the diseased joint, as soon as the inflammation and pain subsides the disease will be found to have been cured.

When a bunion is formed on the outer side of the foot where the little toe joins the foot, the symptoms are somewhat different from those that follow the invasion of the disease at the articulation of the great toe. At first there will be a sense of itching, with some heat and pain, which is increased by the pressure of the shoe or boot in walking, and particularly if the seam of the stocking passes over the seat of the pressure. When the seam of the stocking cannot otherwise be removed the stocking should be turned wrong-side out, and then it will press upon a different part of the foot. It may be that drawing the seam under the foot by twisting the stocking will suffice, but generally, turning it is preferable.

After the pressure is removed the painful part of the foot should be washed with an anodyne lotion and a loose cloth wet with the lotion bound around it, when the pain and inflammation will soon subside. A full and final cure will follow if pressure is carefully avoided and a soap plaster is worn for some days.

If the bursa under the bunion is inflamed, the treatment should be the same as for inflammation of the bursa under a bunion at the joint of the great toe.

Symptoms like those produced by a bunion may be caused by derangement of the system even when there has been no local pressure. The joint affected and the foot becomes very painful, giving rise to great inconvenience in walking; the natural action of the foot from heel to toe is impeded so that sufficient exercise cannot be taken. The pain does not always cease when the shoe is taken off but often continues for several hours afterward. External remedies are of but little service, the disease being influenced chiefly by the state of the atmosphere, improving as the weather becomes more favorable and getting worse with an opposite state of the temperature. As

the general health is affected so in a manner are also the bunions which arise from symptomatic derangement.

The pain and inflammation in these cases come on sometimes so suddenly that the patient is apt to mistake the attack and attribute it to gout, from which, however, it may easily be distinguished by the external tenderness of the joint and the persistence of the inflammation in the latter disease, whereas in bunions the part is not painful to the touch, and the inflammatory symptoms soon subside on the removal of the shoe and the adoption of the usual treatment.

When the joint is merely distorted without any inflammation or induration of the skin, the only inconvenience experienced being from the pressure of the shoe, a mechanical means of relief may be had recourse to by filling up the hollow between the joint and the upper part of the great toe with a piece of adhesive leather sufficiently thick to take off the pressure.

The general rules for the treatment of bunions may be stated briefly as follows: Loose shoes of soft material are indispensable. The bunion must have applications for subduing the pain and inflammation. When the bursa under the bunion is inflamed no shoe can be worn, but the patient must be confined to a couch and the proper appliances made use of to subdue the inflammation. If an abscess has been formed, that must be opened to allow a discharge of its contents, when the orifice must be kept open and some soothing dressing applied until the abscess heals. If the inner surface of the bursa does not granulate it will be necessary to destroy the secreting surface by the application of a minute quantity of strong nitric acid on the point of a stick, or by winding a thread around the end of a dressing probe, wetting the thread with strong nitric acid, and applying that to the internal surface of the bursa. After one or a few applications of the acid the bursa will heal.

Ganglions.—Ganglions, like bunions, are usually the result of inflammation of a bursa mucosa, but not, as is often the case with bunions of a bursa produced by pressure, or any other form of adventitious bursa. Ganglions are sometimes formed on the dorsum of the foot or the instep, and then are quite as

troublesome as bunions. Sometimes a ganglion on the instep produces a permanent contraction of the extensor tendons of the small toes, causing a continuous extension of the toes, and great inconvenience in walking, with lameness.

Wherever the ganglion is situated, as soon as it becomes inflamed and filled to tension with effused fluid, that fluid should be let out by puncture, and the foot kept quiet and at rest until the disease is cured. If the fluid has become hardened so that it will not flow it is probable that a division of the implicated tendon will be required.

The tenderness and thickening which occasionally occurs at the *instep*, as has been observed, sometimes resembles a bunion, and as has been said, contains within the swelling an unmistakable corn. These facts must not be lost sight of, as these different forms of disease require a mode of treatment in accordance with their peculiar nature.

When ganglions have been formed at other localities, some have found *setons* useful in certain cases, but frequently the presence of a seton cannot be borne long enough to affect a cure. Prof. Williams and Mr. Brown strongly advocate the subcutaneous method of opening the ganglions as well as all bursæ mucosæ with a small instrument, as a tenotomy, and think that the viscid contents of the sac, by passing into the adjacent tissue, will excite a degree of inflammation that will probably obliterate the sac. The ordinary cataract needle was a favorite instrument in the performance of this operation with Prof. Williams. Mr. Coulson thinks that caution should be exercised to prevent much inflammation and suppuration. When the contents of the ganglion are removed, a strong solution of iodine (Lugol's), applied to the cavity on lint and the lint covered with oiled silk to prevent volatilisation will often affect a cure.

Abscess.—All collections of pus, from whatever cause, where the pus is collected in any considerable quantities, are called abscesses. Hence abscesses may be formed in the bones and in almost any part of the system in the areolar tissue. A very common form of abscess is the *Boil*, beginning as a small red point in the skin, painful, tender to the touch, harder and deeper than the common *pimple*, with the surrounding tissues con-

densed. The boil slowly expands in the skin and the integuments gradually rise into a conical prominence which is first red, then bright red, or purplish, or livid. After from four to six days a point may be observed in the centre of the prominence which looks lighter than the surrounding skin. If left untouched, in a day or two the skin breaks, some pus escapes, and a slough or core may be seen, which in a few days or perhaps a week more becomes loosened and is thrown off. Then granulations form in the cavity from which the core was removed, the cavity lessens, the granulations fill it up to the surface, cicatrization occurs, and in three or four days from the time the core sloughs the boil gets well.

Although a boil appears to be a small affair, it is attended with great pain, is exquisitely tender, the pain appears more intense at night; and when seated in a tissue that is unyielding the pain is even more intense than usual. If in addition to density of tissue the boil is over or near a sensitive nerve the pain is still greater. This form of abscess is not often met with on the feet.

Carbuncles are hard, flattened, circumscribed tumors, but slightly elevated above the skin, extending through the entire cutis and even beneath it, so as at times to be an inch or more deep. The surface of a carbuncle is red, of a mahogany tint, then purple, then livid; and after the parts heal up the skin still remains red or of a deep brown, and the discoloration remains for some weeks.

Carbuncles are very painful, with throbbing and burning. When the carbuncle is fully formed the surface is livid or purple, the cuticle becomes raised into blisters, there are numerous points of pustulation, and as the pus escapes the cuticle appears to be pierced with small perforations through which a core beneath may be seen. The core is made up of a slough of the fibrous tissue of the inner part of the skin, and as it loses its vitality that tissue appears to be converted into a grayish or whitish pulp apparently soft and mixed with an ichorous purulent fluid. The entire surface of the carbuncle is filled with the perforations through which this fluid oozes. Or, a considerable space of the skin may lose its vitality, turn

black, slough, and leave a large opening into the core. Carbuncles vary in size from an inch to several inches in diameter, and are from an inch to an inch and a half in depth. They are always attended with more or less danger from the great and long continued pain they cause, from the exhaustion of the sloughing process, from the febrile excitement, from their aptitude to excite erysipelas, and from the fact that the disease usually occurs in those already in feeble health. This form of abscess does not often occur on the feet.

Stone Bruise, is the popular name of a form of abscess to which the feet of children and youth who live in the country and go "bare footed" during the warm seasons of the year are specially liable. Although the disease is quite common among those liable to it, the records of the profession seldom even hint at this form of abscess.

Those who are liable to stone-bruise, by going without covering to their feet acquire a thick unyielding and firm sole which is able to resist all ordinary impressions. The thickened skin may become fissured, but bruises and moderate blows make no impression upon it. But harder blows or severe pressure, as by stepping upon a small hard substance, while they may not cause any injury to the skin itself may so wound the structures beneath the skin as to cause deep-seated inflammation and suppuration. When a hurt has produced circumscribed inflammation ending in suppuration underneath the skin in the plantar fascia, or in the cushion of the under surface of the toes or of the bed of the foot, such abscess is very slow in reaching the surface and is less painful than a boil or carbuncle, and less liable to produce constitutional disturbance, and yet it may demand surgical interference.

As soon as deep-seated inflammation is discovered about the toes, the plantar surface of the foot, or the heel, the foot should be soaked for a long time in quite warm weak lye or a solution of some form of potassa, that the thickened cuticle may be dissolved or loosened, when it must be scraped off and the skin shaved thin over the central portion of the inflammation. Frequently the persistent use of a hot alkaline foot bath and the removal of a part of the thickened integu-

ments will put a stop to the inflammation of a bruise and prevent the formation of pus. But if the formation of an abscess cannot be prevented by these means, the inflammation can be checked, and the process of suppuration hindered from extending as far as it would extend if nothing was done.

After the foot has been thoroughly soaked in the hot alkaline bath and the integuments over the seat of the disease are made as thin as they can be made and not cut to "the quick," the limb should be kept in a horizontal position and the foot enveloped in loose cloths wet with water of such temperature as is most agreeable to the patient. If the means used do not prevent the formation of an abscess, or if, as is more frequently the case, the patient does not come under the care of the physician until an abscess has been formed, the pus should be let out by an ordinary incision with an abscess lancet or a bistoury, the sides of the incision cauterised by passing into the cut nearly to the bottom of the abscess a stick of the solid nitrate of silver and letting the silver remain in contact with the sides of the cut for a few seconds until an escar is formed, which will prevent the incision healing by immediate union. Then the pus should be completely evacuated by means of repeated injections of warm water, or a warm infusion of arnica leaves, and the sides of the abscess brought together by gentle pressure applied to the parts. If additional pus is secreted, indicating that the cavity of the abscess is lined with a secreting membrane, a solution of the iodureted iodide of potassium, (Lugol's Solution), should be injected into the cavity daily, until the formation of pus ceases. Whether the abscess originally was a boil, a carbuncle, or a stone-bruise, the local treatment here indicated will be equally applicable. But boils and carbuncles so seldom form on the feet that the peculiar treatment which they require need not be here detailed.

But there is another form of disease, fortunately of rare occurrence, to which the feet of *children* are liable, which, by even shrewd observers, is likely at first to be mistaken for some form of simple abscess, and that is

Ulceration of the Cartilages.—The cartilages of the foot may take on inflammation, which inflammation may produce

ulceration from a variety of causes. However produced, before the ulceration and suppuration has become extensive, and before the pus has been evacuated, a surgeon of even more than ordinary acuteness of observation may suppose he has to deal with a simple abscess within the subcutaneous tissues, and speak slightly of what will eventually develop itself into a very formidable form of disease.

The external appearance of the disease will at first closely resemble an ordinary abscess, but there will be less inflammatory excitement, less heat, less local tenderness, but much more *lameness* of the foot than usually accompanies an abscess. The general system will appear much more involved in the disease than in common abscess, and yet the local pressure of the pus will produce many of the symptoms of a stone-bruise, or of an abscess in other parts of the system.

When the pressure and inflammation of a bunion, ganglion, abscess, injury of any kind, or constitutional derangement, has produced inflammation and ulceration of a cartilage, and particularly any of the cartilages of the foot, a form of disease is the result which is extremely difficult to cure and sufficiently obstinate to try the patience of all.

Four distinct varieties of cartilage may be recognised:—as 1, that of ossification of the bones of the cranium; 2, that which precedes the ossification of the long and short bones, the patellæ, and the bones of the tarsus; 3, the cartilage of adults, as over the nasal bones, at the end of the ribs, joining them to the sternum, and between the vertebræ of the spine; and 4, the fibroid variety into which that at the end of the ribs changes in old persons, and in the canaliculi which are analogous to the Haversian canals in bones. The first and second varieties of cartilages of ossification contain a few blood-vessels, but neither the third nor the fourth varieties, while in a healthy condition, ever contain any blood-vessels.

It is the second variety of cartilage that obtains about the foot, and that variety may be found in children even after the second dentition. If from direct injury or constitutional cause the cartilages of the foot of a child less than ten years of age become diseased and ulcerate, the minute blood-vessels will

swell and the structure manifest the usual symptoms of inflammation; and, being difficult of access as well as liable to constant irritation and injury, the disease will be liable to be of long standing, and at the best to result in a permanent deformity of the foot and ankylosis of the bones.

All the vital forces of the system should be sustained by the proper regimen and diet and the appropriate medicine. The foot must be kept in as nearly an immovable position as possible by the necessary apparatus. All pus and other discharged matter must be removed from the diseased structures by syringing or otherwise several times a day, and the parts protected from any tendency to gangrene or decomposition by injections or washes of a solution of chloride of lime, or if the discharge is profuse, by a solution of alum or the perchloride of iron. These washes should be made to come in contact, by the use of a syringe or otherwise, with the diseased structures, three or four times a day, and yet the foot must be kept quiet. If any part, tissue, tendon, cartilage, or bone, is apparently dying or dead, it may be necessary to touch such part with a point of a stick that has been dipped in strong nitric acid. If any blood-vessel has broken and there is hemorrhage, or if the pus is streaked with blood, the perchloride of iron in solution is strongly indicated.

In the general treatment the use of the vegetable bitters and aromatics, and the phosphate of lime to induce ossification and a gluing together, as it were, of the bones of the foot by means of a bony callous, should be used, as a firm bony union of the parts that were covered with the diseased cartilage is the most favorable termination that can usually be anticipated to this form of disease. If the disease has been the result of some constitutional derangement, as scrofula, or cachexia of any kind, that disease of the constitution must be removed by the diet, the regimen, and the medication the peculiar condition of the patient may require.

Gangrene.—The extremities of the feet are liable to a form of disease that is somewhat analogous to the one just mentioned, but which attacks the feet of old persons or at least those past the middle period of life, and hence is often called *senile*

gangrene, sometimes *spontaneous* gangrene, because it often comes on without any apparent previous local injury. Probably the latter term is the preferable one as it sometimes occurs with the middle aged, and even children have been known to suffer from it.

The reason why aged persons are specially liable to this form of disease appears to be that the arteries become ossified, more or less contracted, and sometimes even obliterated. The ossification frequently extends well up the leg. In some cases where there was no ossification the femoral artery had been converted to a gristly cord that was entirely impervious. This contraction and change does not appear to be the result of any previous inflammation, but rather a slow and gradual degeneration of the tissue.

The premonitory symptoms of this form of gangrene may have been observed for some years before the local mortification is manifested. There will be occasional pain of the toes and the lower limbs, followed with numbness and some difficulty in keeping the feet warm. After the feet get cold and are made warm again the feet and toes may be quite painful with a sense of weakness in the muscles. Persons with this condition of the lower extremities can walk very well for a short distance, but a longer walk soon exhausts them. If but little blood finds its way into the feet and especially after the disease has continued for two or three years, and the heart is excited to unwonted action by running, walking up stairs, lifting weights, or by the excitement of passion,—the circulation being obstructed, the action of the heart is liable to stop and syncope will follow.

The premonitory symptoms may continue for years, and then, on the induction of an apparently trivial and accidental inflammation mortification will very unexpectedly follow. A common occurrence is,—a corn is cut a little deeper than usual, the toe bleeds, inflammation and gangrene follow. Or, the foot gets quite cold, the patient says he put it a little too near the fire to warm it, the toes inflame and mortify. However the local disease commences, almost invariably a slight amount of inflammation precedes the gangrene. Small

blisters form somewhat similar to those of severe erysipelas, the vesicles burst and expose a portion of *dead cutis vera*. Many surgeons have not recognized the presence of this form of gangrene, because the dead flesh does not present the usual red or black appearance of mortification. Owing to the non-supply of blood the dead portions often appear quite *white*, and that peculiarity of color is likely to deceive the unreflecting or inexperienced attendant.

This gangrene may be confined to one toe or several may be attacked at the same time. More frequently only one toe is attacked at first and the disease spreads to the others and perhaps to the body of the foot. The amount of pain in spontaneous gangrene is very variable. Sometimes there is but little, but at others it is excruciating. When mortification has once commenced, a little line of inflammation appears at the margin of the gangrene, which slowly creeps over the toes and up the foot, and mortification follows the inflammation. The general system seldom seems to be much affected, and the patient says, except the disease of the foot, he is entirely well.

A usual termination of this disease is,—after the gangrene has, for a time, seemed to be slow and gradual in its march, extending over months of time, the inflammation becomes more active, the gangrene spreads over the toes and feet, and then a fresh attack of active inflammation occurs, the mortification rapidly spreads, the general system suffers, in part, probably from the absorption of matter from the seat of the disease, the pulse becomes feeble and rapid, the appetite is impaired, the skin becomes hot, the patient falls into a state of stupor, and in a few days dies.

For the treatment of this most formidable disease many remedies have been presented. Amputation after having been tried is now abandoned. The progress of the disease should be checked by local remedies, the pain relieved, the general health fostered, and the dead portions encouraged to slough, leaving the stump to heal by granulation.

The patient must be furnished with a nutritious diet; keep the organs of digestion, assimilation, and excretion, in a state

of normal activity,—give ale, or wine, or brandy, in moderate but uniform quantities if required, and depend upon *opium* if there be no idiosyncrasy in the constitution of the patient, to allay the pain.

The patient must be confined to the horizontal position and kept uniformly warm in the bed. Apply stimulating washes to the thigh and leg but not to the foot. Wrap the foot carefully in carded wool and let the wool come well up the limb so as to preserve in it all the vital heat and vital electricity of the body. The wool should be applied loosely one bat after another until the limb is completely enveloped with it two or three inches thick. Mr. Vance, who for a considerable time was surgeon at Greenwich Hospital, and treated quite a number of patients with this form of gangrene, strongly recommended the use of wool in place of all forms of washes and poultices. Sir Benjamin Brodie says he tried it with success in a number of cases. The wool should be applied in large quantities quite up to the hip, kept in place by a silk handkerchief being sewed loosely over it, and leave the limb undisturbed for several days or a week. Before the wool is placed around the limb it may be well to dress the mortified part with some mild ointment, which may remain unchanged for several days, for the amount of fluid which escapes from the wound is very small, and frequently none escapes. The application of carded wool to the limb seems to do more than insure quiet of the limb and the heart, and to protect it from changes of temperature. Even the diseased arteries appear to gradually resume a healthy condition under the action of the wool. And hence, even after recovery, it is well to keep the limb enveloped in a soft woollen stocking or in a covering of lamb-skin, applied with the wool next the surface of the limb.

Wherever the progress of the mortification is arrested, a distinct line of demarkation or separation of the dead from the live parts can be distinctly seen. The separation usually continues until the flesh is entirely detached, and after a time even the bones become loose. The tendons and ligaments may need to be cut, but neither the flesh nor the bones should be severed by an operation. Cutting off a portion of the dead

substance does no good, and an incision in the live flesh is almost certain to be followed by gangrene and a spread of the disease.

The unpleasant odor which comes from the decomposition of the dead flesh may be overcome by means of chlorine vapor generated by placing some moist chloride of lime near the foot, or by occasionally wetting the dead structures with a solution of chloride of zinc, exercising great caution not to let the solution come in contact with the live parts. Another mixture that is of use as a disinfectant, being a dry powder, may be preferred to the chloride of lime. It is prepared by rubbing together 100 parts of plaster of Paris with 5 parts of coal-tar. This powder may be applied directly to the sore in those cases where there is any considerable secretion of pus or other fluid. Spread on lint the powder makes an excellent dressing.

If the gangrene spreads rapidly and appears likely to ascend the limb and endanger the life of the patient, it is necessary at times to destroy the vitality of the surface parts of the limb in advance of the invasion of the mortification, and to consolidate the dead flesh of the sloughs while they are separating so as to allow a distinct line of separation to be established between the dead and the live flesh. Strong nitric acid appears to answer this purpose better than anything else. It is best applied by first dipping a piece of wood in the acid, wiping the surface of the wood, and then applying the wood to all parts of the sore and to the integuments for some little distance beyond the gangrene. After one or two applications of strong acid, usually, the dead portion will begin to slough off, and then the acid should not be applied again only to parts where the slough does not appear readily to separate from the living flesh. This is a very painful mode of procedure and should not be resorted to except the rapidly extending gangrene requires it.

When spontaneous gangrene attacks the extremities of young persons, the arteries of the legs or feet having become plugged up with fibrinous exudations or by some other means, the brain is quite liable to be simultaneously affected. The

horizontal position, quietude, suppression of all arterial excitement, avoidance of all mental agitation and anxiety, quieting the pain by means of opium or Dover's powder, the use of ammonia or ammoniacal and lemon-juice when the skin is hot and dry, regulation of the bowels if need be by the use of rhubarb or the compound extract of colocynth, wrapping the limb in a large quantity of wool, and a generous, nourishing but not stimulating diet,—and waiting for the separation of the dead parts—are equally applicable to the young as to the aged.

White Swelling.—This name is sometimes applied to two distinct forms of disease:—that form which is connected with a *scrofulous* disease of the bones and ligaments, and that which sometimes accompanies or follows acute rheumatism or other disease of the membranes of a joint and is often known as *hydrops articuli*. White swelling in the feet is not a common disease, but is sometimes met with in persons of all ages after childhood. It is always connected with one of the articulations.

White swelling in the feet is almost invariably the result of a species of softening of the bones of the arch of the foot, an absorption of some of the earthy matter of the bone, and a tuberculous deposit in the cancelli of the bone. But the deposite of tuberculous matter only occurs in the latter stages of the affection. After a deposit has actually occurred the disease of the bone appears to be beyond cure; but in the earlier stages, if the nature of the disease is recognized, then it may be arrested in its progress, and perhaps the bones restored to health and the foot saved, with no change, or but a slight one from its natural condition.

Usually the origin of the difficulty is supposed by the patient to have been a mis-step, a slight hurt, or a sprain; but probably the parts involved had previously commenced to degenerate, and the injury was that which called special attention to the foot. There may have been pain in the knee or some degree of weakness of the ligaments of the ankle or foot,—and afterward the lameness increases, becomes permanent, and more distinctly localized. Soon walking or other motion of the foot causes swelling which disappears by morning. But the pain is much greater in the morning than after standing and walk-

ing an hour or two. After a while longer the swelling does not disappear during the night, and the lameness and pain may confine the patient to bed. Then the entire foot and leg swells, but the swelling is more noticeable over the articulations which are diseased; soon the elevated points of the swelling will become soft, and distinct fluctuation can be discovered, showing that extensive suppuration has already been established. In this disease the amount of inflammation has not been sufficient to attract special attention, and even over the places where the abscess points the skin is but little changed in color. It may be slightly violet or yellowish and shining, but the change in color escapes observation until the attention is specially called to it.

The pus is quite deeply seated, and there may be two or three distinct collections which do not communicate with each other. When the abscesses are opened, pus of an unhealthy character will be discharged, and the probe can be passed so as to come in contact with bone denuded of its coverings. In children, where the bones of the foot are not firmly ossified and the disease has been of long continuance, the bones undergo a kind of interstitial atrophy and can readily be penetrated with a sharp instrument.

Sometimes the foot and limb do not swell much, and there is not much change in the form or appearance of the foot, nor much pain or tenderness on pressure; but the use of the feet for an hour or two always causes considerable suffering. But, almost invariably before there is any considerable amount of suppuration there is decided swelling of the foot and limb.

This disease usually attacks the articulations of the middle portion of the foot and the scaphoid and the cuneiform bones; and hence when the disease is removed by an amputation, it is desirable to adopt Choupart's operation, separating the foot between the calcaneum and the astragalus, and between the scaphoid and cuboid bones. This operation appears to be less dangerous than the sub-astragalian, and usually removes all the bones involved in the disease.

Seldom are patients with this disease placed under the care of a physician early enough to allow of any hope of relief

except through amputation. An attempt may be made by local treatment similar to that recommended for *ulceration of the cartilages*, to put a stop to the progress of the disease and to unite the bones of the foot by ankylosis, but such attempts are seldom successful.

The cachexia under which patients with this disease always suffer will require its special constitutional management, whether amputation be resorted to or not; which treatment is detailed in full in the works on Scrofula.

Unclassified Affections of the Bones and Joints.—There are diseases to which the feet are subject, somewhat allied to those heretofore noticed, which require a brief mention. The ordinary change in position of the joint of the great toe which is usually accompanied with a *bunion*, has been observed to be accompanied by acute inflammation, resulting in an abscess without a bunion, which, at the end of a year or so had produced a collection of pus in the phalango-metatarsal articulation, with destruction of the articular cartilage and such other disorganizations as render amputation of the toe necessary to save the life of the patient.

On the plantar surface of the foot, over the projections of the end of the phalangeal bones, there has been observed, first, a rising of the epidermis, which in time becomes destroyed, and then a discharge of limpid serosity, after which there was a fistulous opening through which pieces of dead bone were discharged. Amputation after amputation failed to arrest the disease. Another patient had inflammation, ulceration, and fistulae at the points of the pressure on standing, back of the large toe, after the little toe, and at the heel. The ulcers around the fistulous openings were very painful to the touch, pieces of bone were discharged, and after a time the patient appeared to get well.

Sometimes the *os calcis* is the seat of a disease, which Mr. Erichsen thinks always commences with the bone, but may extend to the articular cartilage. This disease affects, particularly, the cancellous portion of the bone, and frequently that loses all vitality while the external shell remains sound and nearly healthy. A T shaped incision through the soft

parts should be made over the seat of the disease, the angles of the flesh dissected from the bone and turned back, and then, with a gouge forceps and straight bone forceps, all the diseased bone must be removed with as little disturbance of the periosteum as possible. Even if nothing but the periosteum remains, that may suffice to insure the growth of new osseous structure to take the place of that removed. If bone does not form, the space will be filled with a kind of fibroid tissue which may in time become ossified.

If the os calcis is affected on its upper surface, and the ankle-joint and extremity of the bones of the leg are also affected, it will be necessary to remove the diseased parts from all the bones affected, and then the bones must be brought together and kept as immovable and quiet as possible, that the bones of the joint may become ankylosed, and only a stiff ankle the final deformity.

When there is caries of any of the bones of the feet, and the carious portions can be reached with the gouge, gouge-forceps, or the ordinary bone forceps, it is always better to remove the diseased bony structure than to wait the slow and uncertain process of liquification or exfoliation, except in quite young children, who often recover from caries of the tarsal bones by the aid of the constitutional and local treatment already detailed,—and in addition, *protein*, which has been highly extolled by Mr. Tuson and others, may be made use of. Some years ago a boy was admitted to the Middlesex Hospital, with very extensive caries of the bones of the foot, and in two months, with the use of no other medicine than protein he was completely cured, although the disease had previously resisted all the means which had been employed. Many other cases of caries of the bones in different parts of the body are reported, in which protein appeared to exert an immediate and curative influence on the disease. It has also been used in various destructive diseases of the soft parts, as scrofula, ulcers, and general debility of young persons. The amount used has varied from five to thirty grains a day, along with the food. It is recommended to be used in all cases where we wish to aid in the restoration of any part lost by sloughing,

- ulceration, or otherwise. Of course, chloroform or some other anæsthetic will be administered previous to attempting the painful and tedious operation necessary for the removal of carious portions of the bones of the feet.

A Gentoo patkee bearer, who had been employed in catching fresh-water fish, first observed a small hard lump on the right foot, which remained without apparent change for a time, when a small circular ulcer appeared upon the tumor, which was not very painful. After a time other tumors appeared, and like the first ulcerated; until, finally, he was unable to stand, and, sitting, he used his hands to move himself from place to place while in a sitting position.

At that time nearly the entire foot, both upon the sole and on the top, appeared as if filled with ulcers and fistulas,—honey-combed,—the ulcers being small, indolent, with abrupt margins, deep, and having at the bottom a whitish-colored substance which appeared to be the areolar tissue.

The entire foot appeared to be slightly enlarged; the skin, between the ulcerations was natural in color, but slightly thickened, hard, with occasional small lumps in it in various stages of growth from incipiency to actual ulceration. The ulcerations extended halfway up the leg toward the knee. The toe nails appeared natural.

As no progress toward healing the ulcers followed the treatment adopted, amputation of the leg was resorted to; and on examination the entire integuments of the foot was found to be studded with tubercles of a pale brown color, the tubercles having in them distended blood-vessels. Some of the tubercles were round, some oblong, and varying in size from that of a large mustard seed to the size of musket balls. Some of the ulcers reached quite to the bone, and the periosteum in many places was destroyed and in others detached from the bone. The extensor tendons were partially destroyed, the tendo Achillis was entirely destroyed and in its place was a kind of fatty jelly. A gelatinous substance was deposited around most of the tendons. All traces of the muscles of the foot were absent, but in the leg there were a few muscular fibers. The bones of the foot appeared as if worm-eaten.

After this case had been described, three more of a similar character came under the care of Mr. Godfrey, who amputated in each case; the natives appeared to be acquainted with still others.

A disease different from the one just described and known in Paris as the *Perforating Disease of the Foot*, was made the subject of a thesis by M. Leplat, who saw eight cases of it while attending a hospital.

This disease appeared at first as of a horny production at the sole of the foot and over the most projecting parts;—then an ulcer formed, which was surrounded on all sides by a circle of thickened epidermis and from which there was discharged a sero-sanguinous fluid; then followed inflammation of the bursæ, the tendons, the synovial membranes, and the periosteum; then inflammation of the bones, with caries and necrosis.

The disease usually commenced on the sole of the foot and at the pulp of the heel and the toes. He was of the opinion that it originated from too severe and irregular pressure of parts of the foot upon the sole of the shoe. That the pressure produced thickening of the skin of the sole of the foot. It appeared to attack those whose occupations kept them standing quietly on their feet. No treatment which has been devised appears to be successful in curing the disease after it has attained much progress.

Foreign Bodies in the Feet.—The position and use of the feet render them peculiarly liable to being wounded with sharp substances, as nails, pieces of glass, needles, etc., which substances are often retained in or under the plantar fascia or in other parts of the foot. While the wound caused by the penetrating substance remains still open or has a suppurating canal reaching to the foreign body, the foreign body can often be removed by the use of proper instruments, without difficulty and with no other operation than, perhaps, enlarging the wound. For the removal of all such bodies as are penetrable, as wood, lead, and other soft metals, the newly devised *rat-tooth bullet forceps* is the most desirable instrument. For harder substances the ordinary dressing forceps and other common instruments are far preferable to the more complicated ones. If

the foreign substance is implanted in a bone or firmly bound by ligament, tendon, or fascia, it may demand considerable force and strength of instrument for its removal.

In the exploration of a wound in the foot to discover a foreign body, in addition to the extracting instrument the surgeon will need one or two silver probes, a syringe, a groved director, a blunt-pointed bistoury, and a blunt hook. The sense of touch must be so delicate that a foreign body when reached by the probe can be distinguished from a bone denuded of its periosteum. The extraction of balls, grape, or fragments of shells, from the articulations is often quite difficult, but meddlesome or very severe manipulations should not be indulged in.

Sharp and long substances, while the wound they made is still open, as nails, etc., are very readily extracted by the simple forceps without enlarging the wound, but if the substance cannot be removed readily a little cutting will seldom do any harm. Needles entering the foot do not always cause a sufficient wound that they can be traced readily; and if a needle has been some hours or days in the foot before the surgeon is called, it may be impossible by any ordinary method of exploration to determine the position and location it occupies. Hence it has been proposed to render the needle magnetic, when, by means of another needle, the position of that in the flesh can be determined. If the method proposed will enable one to discover the whereabouts of needles, it will also serve to detect the locality of other bits of steel and iron.

Steel or iron becomes *magnetic* when placed under the influence of the galvanic current, and when thus magnetized it attracts other pieces of steel which are not magnetized. The iron or steel in the flesh can be rendered magnetic by passing a galvanic current into and through the foot, *across* the point where the steel lies, and not in the ordinary way from above downward. This application of the galvanic current should be continued for some time. Or, when the substance is not imbedded too deeply in the flesh, a large magnet kept on the surface for a considerable period of time, as an hour or more, will magnetize by induction the imbedded piece of iron or steel. Whenever a large and powerful magnet can be com-

manded, the latter method of magnetizing the steel or iron will usually be quite as efficient and less troublesome than the use of the galvanic apparatus.

To test the existence and determine the location of the iron after it has been magnetized, a *magnetized* sewing needle should be suspended by a hair or a thread of spider's web, or a piece of silk as it comes from the worm, the thread to be several inches long. As the suspended needle is carried near the iron or steel in the flesh it will manifest the presence of that steel by well-known magnetic phenomena, as by attraction or repulsion; or will appear unsettled, so that by a little patience and careful manipulation the location of the object and its extremities, or the position of its negative and positive poles, and consequently its magnitude, can usually be determined. Even a very small point of a needle can be determined in this way.

For the removal of needles or of pieces of glass or other substances, when their exact locality cannot be determined, as when the wound made by its entrance was small, or has healed up, and especially when it has remained so long as to become invested with a kind of tough capsule, it is best to make a V shaped incision, which shall include within its angles the foreign substance, when the skin and tissues between the incisions should be dissected up, the capsule cut across, the foreign substance removed with the forceps or otherwise, and the capsule or walls of the cavity in which the substance was lodged freely scarified, so as to prevent that from becoming a secreting surface, and preventing the wound from healing or causing it to break open again.

Punctured Wounds in the Feet.—Sharp pointed substances as fragments of nails or glass, often penetrate the soles of the feet and are apt to cause much pain and inconvenience. Not infrequently do they become healed in, leaving prominent and tender scars, and then it is not only necessary to remove the foreign body and destroy its investing capsular membrane, but the scar itself must be cut away, leaving the wound to heal by granulation. Those irregular cicatrices, when painful, often contain a minute point or scale of the foreign substance.

by which the original wound was caused, which has escaped detection; and the irritation of the nerves thus induced may cause spasmotic contraction of the muscles of the limb, a general disease of the nerves resembling epilepsy, and lock-jaw, and death.

Whenever the foot receives a penetrating wound, as by treading on a nail, or by some sharp substance penetrating the dense fascia of the foot, or wounding the tendons or ligaments, more harm may be done than usually follows a similar wound in other parts of the body, partly from the nature of the structures wounded, their density and their uses, and partly from the liability to motion and other injury peculiar to the uses and functions of the feet themselves. Hence quietude and the horizontal position should be enjoined when the feet have been punctured, with more care and positiveness than if a similar wound had been received in another part of the system.

If the external orifice of a punctured wound is small, and the wound is of any considerable depth, the orifice should be enlarged. If the nature of the substance which caused the wound was such as to render it possible that any part of it remained in the foot, or that it carried any portion of the clothing of the foot into the wound, the puncture should be cautiously but thoroughly examined so as to detect and remove all foreign substances. Whether there is any foreign matter in a punctured wound of the foot or not, such wound should not be allowed to heal by immediate union, but encouraged to suppurate; for portions of the fascia and tendons or ligaments, have probably been so injured that they should soften and be discharged before the foot can heal up soundly; and if the skin heals up while these injured particles remain in the foot, abscesses, with ulceration of the cartilages or of the bone, may follow; with such disorganization of the foot as will cause permanent lameness or even loss of the foot. Such severe injuries have followed so slight wounds as those caused by treading upon a carpet tack.

As soon as the opening of a punctured wound of the foot has been enlarged, and all foreign substance removed, the wound should be syringed with a weak solution of potassa

or of the chloride of zinc, the limb placed in a horizontal position, and the foot enveloped with *one thickness* of cloth wet with cold arnica water, or if the foot is painful, with an infusion of strammonium and arnica combined. Where there is any marked tendency toward inflammation, cold lotions of lobelia and the bitter herbs steeped in vinegar-and-water may be preferable to infusions of herbs in water alone. All inflammation and pain should be subdued as soon as possible, and active suppuration from the wound promoted and the wound kept open for some days, so as to allow all foreign and dead matter to be thrown out,—and, finally the wound allowed to heal, but only when the healing process has commenced at the bottom of the wound. Great care should be taken to insure quiet and rest in all cases of punctured wounds of the feet which are accompanied with inflammation, even if the wound itself appears to be but a trivial one, for neglect of these precautions may cause a loss of the foot or even a loss of life; in comparison with which, confinement to a couch for a few days is too insignificant to be taken into account. Ordinary incised wounds of the foot, are to be treated like similar wounds in other parts of the body.

Contused Wounds of the Feet.—The position of the feet renders them specially liable to suffer from contused wounds, as from heavy bodies falling upon them, or from their being trampled upon by the feet of horses and other large animals. When speaking of the *nails*, brief directions were given in regard to the management of those contusions whose force is manly expended upon the toes: but the *feet* are sometimes very severly contused, and such wounds demand special treatment.

Nelaton says that *cold irrigations* are of peculiar value in the treatment of contused feet, where there is both laceration of the soft parts and crushing of the bones. Breschet and Sanson have also reported in the most favorable manner in regard to the use of irrigations in these wounds. The temperature of the water should be regulated by the feelings of the patient. When there is much inflammation, cold water will be the most agreeable and the most beneficial; but as soon as the inflammation is subdued *tepid* water is generally

preferable. Tepid water, applied to wounds, has all the *softening* properties of poultices. The healthy tissues readily absorb tepid water, that fluid taking the place of the blood, so that the flesh becomes soft, pale, and nearly bloodless as well as relaxed; and as it is a good absorbent of heat and electricity it removes those agents, subduing inflammation, quiets the pain, and favors resolution. It is cheap, always at hand, and infinitely more cleanly than ordinary fomentations, poultices, or ointments; and, by carrying away all discharges from wounds and hurts, it prevents the formation of those deadly *gases* which result from the putrefaction of pus and other animal secretions, which are absorbed by poultices, and which sometimes induce what is styled *hospital gangrene*, and frequently cause the death of those exposed to their influence.

The water-dressing, to contused feet, may be continued as long as any dressing is required. It may be composed simply of pure water, or any medicament may be infused in the water which is thought to be needed; but usually pure water is all that will be required. As has been already stated, it may be of that temperature which is most agreeable to the patient, and applied by means of any apparatus which will insure a constant supply of fresh water to take the place of that which has become contaminated by being brought in contact with the injured structures. The value of water, of the proper temperature, and judiciously applied, in the treatment of many forms of surgical diseases, has not been fully appreciated by many both out of and in the medical profession.

Sprains of the Foot.—Whenever joints occur which have but limited motion, and particularly of the *hinge* variety, such joints are liable to be *sprained*, or wrenched by violence in an unnatural direction, or in the natural direction, to a distance beyond their natural motion of extension or flexion. Although not as liable to this form of injury as some other parts of the system, the joints of the foot are, not seldom, sprained; from some inequality of the surface on which the foot is placed, or some mis-step in walking.

In accidents of this nature the tendons and ligaments are stretched, the soft parts about the joint are bruised, perhaps

the smaller vessels are ruptured, the synovial membrane crushed or contused,—and acute pain immediately is experienced, which soon becomes more and more severe, while the slightest motion in the injured foot becomes exceedingly painful, and soon the power of standing or walking on it may be entirely lost, the effort causing sickness at the stomach, loss of strength in the general system, and perhaps fainting.

The injured joints soon swell, the foot becomes red and hot with violent throbbing, and, if there is extravasation from rupture of the small vessels, the surface will become mottled or "black and blue." In severe cases, the ligaments become not only stretched but torn, and the tendons and muscles are also injured. As ligaments and tendons are but slightly elastic, the stretched tissues do not readily become restored to the natural condition, and hence the injury becomes not only troublesome and tedious of cure, but quite liable to recur in future.

If sprains are not quickly attended to after the accident, particularly in persons past the middle age, they frequently prove very serious, and may require a longer time for the cure than a dislocation or even a fracture. Sometimes they cause extensive synovitis, or the bones may be affected as caries or white-swelling result.

The first thing to be done for a sprain of the foot, is to prevent inflammation and infiltration of fluids into the soft tissue; or if the case does not come under the care of the surgeon until the injured parts are inflamed and swollen, the inflammation must be subdued, and the deposit absorbed and carried away. The limb must be placed in a horizontal position, the toe gently supported so as not to have any of the tissues put upon the stretch, the foot and limb kept not only cool but quite cold, by constantly bathing with cold, or even ice-water, to prevent any accumulation of blood in the injured vessels; and as soon as the surface of the foot and leg are well blanched with cold *galvanism*, in a steady and continuous current, should be made to traverse the injured joints in all directions, for a half an hour or more. This will prevent congestion, infiltration, and swelling, and tend to restore all the injured tissues to the normal vital activity.

The limb and foot should be kept quiet and cool for several days, or until but little lameness remains; and two or three times each day the application of the galvanic current should be repeated so as to insure an active vital condition of all the injured parts, and to prevent the accumulation of any adventitious matter in the injured structures.

If, as is usually the case, the surgeon is not called to a sprained foot until active inflammation has already set in, the *first* object will be to subdue that inflammation. For this purpose perfect rest and quietude must be enjoined; the limb must be kept extended and as much elevated above the recumbent body as can be done with ease, that the blood in the foot may readily gravitate toward the body; and the foot kept at that temperature which is found to be most agreeable to the feelings of the patient, by means of thin cloths dipped in cold, or cool, or warm vinegar and water, spread upon the foot, and evaporation allowed to occur unobstructed by any covering except the one thickness of wet cloth. Any considerable pain may be subdued by proper doses of Dover's powders or extract of valerian, and all arterial excitement controlled with the tincture of gelseminum. Hydrogogue saline cathartics, as the sulphate, or acetate, or citrate of magnesia, in rather small doses, may be given daily, and a mild but nutritious diet.

In cases where the surgeon is called late, the use of the galvanic current is quite as beneficial as in those cases which he sees immediately after the accident; for the *second* object of treatment, that of restoring the injured structures to their natural activity and strength, and of causing an absorption of all inflammatory exudations, will be better accomplished by means of galvanism than by any other known agency.

It has been well said, that galvanism may be considered a stimulant to the nervous system, a stimulant to the most minute fibrillæ, to the most delicate structure, and likewise to the neurelima or sheath of the nerves, promoting speedy absorption, so that, should the sheath, or any investing membrane, or any nervous fibres be thickened or enlarged by extravasation or any other means,—by stimulating the nerves, promoting absorption and removing the deposit, the part

will assume a healthy action. In case of a sprain, the ligaments have been stretched or lacerated, the synovial membrane has been injured, the tendons and their thin sheaths more or less bruised, the areolar tissue distended by extravasation; and it requires an amount of action in the parts injured, which the compressed and injured nerves cannot readily impart, to restore these structures to their condition of health. Galvanism can be so applied as to take the place of *vital* force, and thus restore health to the tissues injured by the sprain. It produces absorption of all extravasated matter more readily than any other remedial agent with which we are acquainted, while at the same time it imparts motion, sufficiently active, to all the structures which are concerned in the movements of the joint, and that too, while the joint is kept at rest from all hurtful motions or uses.

Rest, quiet, and ease, seem quite as essential as to prevent or subdue inflammation and to promote absorption; and without the necessary rest, even galvanism may not be able to produce a cure of a sprained joint for a long time. By a premature or careless use of a sprained joint, inflammation will be renewed, become chronic, the extravasated fluid will become hardened, the bones, membranes, ligaments, and tendons, may become more and more involved in disease, and, finally, the limb demand amputation. Several of the more serious diseases of the foot, as ulceration of the cartilages, caries of the bones, white-swelling, and abscess as well as permanent weakness and tenderness of the joint, have been supposed to have had their origin in sprains which have been neglected or mismanaged.

Chilblain.—Several different forms of disease have been described under the general name of *Chilblain*, and hence there has been no small amount of confusion among writers in regard to the nature of the disease and its treatment. To avoid this confusion it is well to use the name here adopted to the disease itself, and use some of those names used by different writers as indicative of *varieties* of the disease.

If any part, as the foot, is exposed for a considerable length of time to a depression of temperature not quite sufficient to

produce coagulation, the nerves of the part thus acted upon will lose their sensibility, and at the same time the circulation of blood will be diminished in activity and quantity, and the chilled structures will become numb, pale, contracted or diminished in size, stiff, or even incapable of motion.

If this condition is suddenly arrested and changed by the sudden application of heat, it will be followed by a distention and weakness of the walls of the blood-vessels, congestion, pressure upon the nerve-branches, increased sensibility or pain, and a changed or diseased condition of all the structures that have been affected with the cold.

The amount or degree of disease will vary from a mere chill of a small extent of the skin, to a severe affection of the dermis, with its blood vessels and nerves, and also of the structures under the skin. Parts that have been frozen are surrounded with structures that did not quite congeal, and hence frost-bites are almost constantly complicated with chilblains, provided that the parts frozen were for a long time exposed to a considerable depression of temperature, and were subjected to a careless application of heat. As a part actually frozen attracts more attention than one which is only chilled, often even a somewhat severe frost-bite proves to be less troublesome and more readily curable than a chilblain that at first did not attract any special attention.

A chilblain, as ordinarily brought to the notice of the surgeon, presents the appearance of an inflammatory swelling of a lurid red color, accompanied with paroxysms of intense itching and pungent pain, the paroxysms at times being almost intolerable. When the chilblain has been improperly treated, the redness becomes deeper, almost purplish, vesications followed by ulcers form on the surface, even the bone beneath may become affected with caries, and the soft structures take on gangrene or mortification.

Chilblains are naturally divisible into varieties in accordance with the severity and extent of the disease. When the disease is slight, confined to the superficial parts, and of but limited extent, it is called a *Pernio*. When still more extensive, and yet not very severe, it is sometimes called a *Kibe*.

But the best and most rational method is to give the name *Chilblain* to the disease, and then make use of some term which clearly indicates the nature of the disease.

The *Erythematous* chilblain, is that where the chill has not been particularly noticed but has been sufficiently protracted to produce considerable depression of the vital forces, with a loss of the contractile power of the coats of the veins which leads to congestion, and the resultant erythema. Children are quite liable to have this variety of chilblain attack their feet. When a child has been kept in a cool room or at school, during the day, and returns to a warm room and a seat near the fire, the heels or the toes commence to itch and tingle, and on examination are found to be red and swollen. In a day or two, the itching having provoked severe friction which aggravates the disease, the pain, tickling, and itching become almost intolerable, and the paroxysms run into each other so as to allow no period of ease. Even the sleep of childhood may fail to overcome the child for hours. The next morning, or within a day or two, the surface of chilblain turns bluish from the extravasation of blood into the areolar tissue, which extravasation presses upon the arteries, and thus lessens the amount of arterial blood with which the part is supplied.

As the vital force of the diseased structures are permanently diminished, even less exposure than that which first produced the disease will be sufficient to perpetuate it; and thus the disease may continue during the whole of the cold season. Or, fresh chilblains occurring, may give rise to increased swelling and tenderness of the feet, with lameness, even sufficient to render walking quite painful, and an increase of the annoying itching at each change in the atmospheric temperature. Similar chilblains may attack the lobes of the ear, the nose, or the hands; being produced by the same cause, and amenable to the same treatment as when they appear on the feet.

The *Vesicated* chilblain, is where the cold has been more severe than that which produced the erythematous variety, and the vital forces of the part have been more depressed, causing the death of portions of the epidermis and separation from the

dermis underneath. The itching, swelling, congestion, and increase of temperature are more prominent than in the former variety. The separation of the epidermis from the cutis-vera allows an exudation of a kind of serous lymph, which acting upon the structures causes an increased size in the vesicles, which fill up and form bullæ of considerable size. As the walls of the smaller congested veins yield, the contained blood flows out and mixes with the serum, giving it a red appearance, while the corroded surface under the bullæ becomes mottled with blue, red, and gray, the gray patches indicating death of the surface in places with the dead portions already beginning to slough.

In addition to the heat, tingling and itching of the more common form of chilblain, the vesicated variety is attended with considerable pain, and lameness sufficient at times to entirely prelude walking. The ulceration may spread, the disease become very troublesome, and continue, with abatements and exacerbations during the entire winter.

The *Gangrenous* chilblain may follow the preceding variety, but is usually accompanied with an actual frost bite. As a part of the diseased structures has had its vitality destroyed by the excessive cold, the dead portion becomes gangrenous and sloughs, and the surrounding structures, not having their vitality entirely destroyed, become affected as in the vesicated variety of chilblain, with the local symptoms already enumerated. In addition, the absorption of matter from the gangrene, or the severe depression of the vitality of the general system, or a combination of these causes, produce general prostration, congestion of some of the more important internal structures, particularly the brain, and sometimes death.

The *Treatment* of chilblain must be varied to suit the various effects the cold may have produced, and the amount of derangement that the functions of circulation and innervation have sustained; but always with the intention of sustaining what vital force there is remaining, and restoring the diseased parts to their normal condition as soon as possible. When the feet become chilled and the subsequent inflammatory excitement is quite active, that activity must be subdued, or

the diseased structures may entirely lose their vitality, and decomposition of the dead tissue will soon follow. The tendency to chemical change must be counteracted and the excitation quieted. If the chill is discovered before much or any inflammation and nervous excitation has set in, the chill must be overcome, and the parts brought to their normal condition *very slowly*, and very gradually. The affected part must not have heat applied to it, but kept cool and brought to the usual temperature very slowly indeed. If the patient is kept in a cool room, and the vital warmth and activity of the part affected be restored solely by the application of the warm hands of healthy persons without the application of any artificial heat, and without any but the most moderate and gentle friction, the probabilities are that no chilblain or only a very mild form of chilblain will follow. If the chilled part be actually frozen, it will be well to let the foot still be covered with the stocking, or wrapped in soft flannel, and kept for a time in a place but little warmer than the freezing point, protected cautiously and effectually from any air that is much warmer than the frozen part, and only warmed by the application of hands outside the woolen covering; so that innervation and circulation may be slowly and gradually established, mainly through the vital heat and vital forces of the patient's own body. The surface of a part frozen must not be thawed, even by the application of the hand, until the structures underneath are entirely freed from congealation, so that the blood and the nerve aura can pass freely to the extremities of the blood-vessels and the nerves, and thus protect the frozen structures from the chemical changes they would be liable to if those changes were uncontrolled by vitality. Only by a slow and cautious thawing a frozen part, from within outward, can the vitality of congealed structures, with any certainty be preserved. Even the *direct* application of a warm hand will almost certainly prove injurious, until the vital activity of the general system has recovered from the depressing influence of exposure to cold. No friction is ever admissible to a part while still frozen, and even the gentlest may be hurtful when applied to any part that has been severely chilled. After the parts

have become of the natural temperature, there should be applied some mildly stimulating liniment, and then the injured limb should be very carefully wrapped in cotton batting or carded wool, or in soft flannel, so as to keep the temperature uniform and also protect the injured surface from contact with the atmosphere. One of the most comfortable liniments for ordinary chilblains, is composed as follows:—

R Collodion, fʒj.
Venice Turpentine, fʒss.
Castor Oil fʒij.

M.

If, as is commonly the case, a chilblain is not brought to the notice of a physician until the *erythematous* condition has been developed, of course the precautionary measures just described are not to be resorted to. Gentle frictions of the surface with the palm of the hand in which there is plenty of pulverised starch, to protect the surface from abrasion and also from atmospheric impressions, will give great relief from the intolerable itching and smarting. Various stimulating and narcotic liniments have been recommended, but none of them, even the most useful, have appeared to be equal to petroleum, or coal oil, which has been used within a year or two. It may be kept almost constantly applied to the diseased surface by saturating a cloth with it, and then binding the cloth on the seat of the injury. A quiet steady application of a liniment or wash, in this manner, to any part where the skin is involved in the inflammation, should always take the place of the most gentle friction.

Nitrate of silver dissolved in water, of the strength of from ten to sixty grains to a fluid ounce of water, has been sometimes found useful after other applications had appeared of no benefit. Tincture of cantharides, to stimulate almost to the production of vesication, has also been used in the more intractable forms of the disease. The tincture of capsicum has been presented as a specific in this disease. The *Baume Chiron ou de Lausanne*, which is composed of:—

Olive Oil, fʒx.
Venice Turpentine, fʒij.
Yellow Wax, ʒj.

Boiled together, strained, and while still warm, add, with constant stirring until the balm cools, a mixture of:—

Balsam of Peru, 3ij.
Camphor grs., jx.

Another formula has been given for this celebrated *balm*, which may sometimes be preferable. It is as follows:—

R Olive Oil, fʒv.
Venice Turpentine, fʒj.
Yellow Wax, ʒss.
Alkanet Root, ʒij.

Mix these, boil them together, strain,—then,

R Balsam of Peru, fʒj.
Camphor, grs., v.

Mix these, add them to the warm mixture, and stir constantly until it becomes cold.

This “balm” should be spread on soft cloths and then applied to the part affected. Another mixture which has been highly lauded in this form of chilblain, is composed of:—

R Rectified Oil of Turpentine, fʒj.
Sulphuric Acid, gtt., xv.
Olive Oil, fʒj.

M.

This is to be rubbed gently on the seat of the disease twice a day.

Dr. Berthold has urgently recommended a wash prepared by taking an ounce and a half of bruised nut-galls, boiling them for fifteen minutes in half a pint of water, and strain the liquid. This fluid is to be applied to the parts affected two or three times a day. A very similar but neater application is composed of tannic acid dissolved in glycerine. A mixture composed of:—

Collodion, fʒiv.
Venice Turpentine, fʒss.
Castor Oil, fʒj.

is quite as neat and even preferable in cases where there are fissures or small blisters.

Very popular applications for simple chilblains, of the variety here considered, are:

I. One ounce of sulphate of zinc dissolved in one pint of water. With this bathe the affected parts several times a day.

II. One ounce of muriate of ammonia, dissolved in half a pint of cider vinegar. Applied as above.

III. Take of the compound soap liniment two ounces, and one ounce of the tincture of Spanish flies, mix them, and use as already directed.

IV. Take of vinegar and of alcohol a half pint each, muriate of ammonia, one ounce, mix and dissolve. To be used like the former ones.

But, as already said, for chilblains, while in the erythematous condition, nothing appears of such uniform utility as the ordinary petroleum, or as it is also called, the Kerosele oil. The notorious *Mexican Mustang Liniment*, composed of:—

Petroleum, fʒij.
Aqua Ammonia, fʒj.
Brandy, fʒj.

M.

has been found valuable in those cases of extreme vital depression, where the oil alone did not appear to be sufficiently stimulating. Vesicated chilblains require to be treated with quite as powerful stimulation as the more mild form of the disease, and yet with caution not to destroy any of the remaining vitality.

A solution of the nitrate of silver in water, a strong solution of alum in water, a weak solution of the sulphate of zinc, or a dilution of Lugol's solution of iodine, all appear to be excellent washes in this form of the disease. Only by trial can the proper strength of these solutions, for the individual cases, be determined. By using first a weak solution, and then, gradually, one stronger, the requisite strength can readily be determined.

Sometimes, when the inflammation and swelling are quite as important as is the fact that there are vesications, an application similar to those used in scalds and burns is of great efficacy. The *Baume Chiron ou de Lausanne*, the formula of which is already given, is of use in these cases. So is M. Devergier's ointment, composed of:—

R: Lard, ʒj.
Acet. Lead, grs. v.
Ext. of Opium, grs. iij.
Creosote, grs. x. M.

Lisfranc recommended a lotion of the chloride of lime, with which to wet lint, and thus applied to this variety of chilblain. The common *Linimentum Calcis*, or what is far better, a liniment composed of equal parts of lime water and petroleum, will be found to give prompt relief in most of these cases.

Ulcerated or gangrenous chilblains, such as are less fre-

quently presented for treatment, require the most cautious and persevering treatment. The benzoated oxide of zinc ointment, Peruvian balsam, the balsam of tolu, lint soaked with port wine, the *Baume Chiron ou de Lausanne*, a solution of chloride of lime, or of the chlorate of potassa, or M. Devergier's ointment, may be useful,—and demanded to be used perseveringly until the ulcer assumes a natural appearance. Even one or more applications of strong nitric acid to the gangrenous portion, may promote a slough and hasten a cure. After the central or ulcerated portion has assumed a more vitalized condition, it may be treated as simple ulcers are treated; and the surrounding structures may be treated with the balsam of tulo, or with any other agent the peculiar condition of each case appears to demand.

Where a considerable amount of substance dies or nearly loses its vitality from exposure to cold, the vital forces of the whole system must be sustained by such dietetic, hygienic, and therapeutic management as is required after amputations, or any other local injury that *may* throw the patient into the *typhoid condition*. Quinia, beef-tea, porter, ale, and brandy, must not be forgotten, for each of these articles may be required. Attention to the action of the entire organism, that there may not be any embarrassment or derangement of any of the organs of assimilation or of elimination, is almost as much needed as attention to the seat, extent, and nature of the original disease.

Fissures.—Fissures between the toes, or under the toes where they unite with the foot, as caused by an acid condition of the perspiration, and want of frequent bathing, have already been mentioned. In addition to the treatment already recommended, even quite large fissures can be cured by saturating a soft woollen string with glycerine, and then tying the string loosely around the toe in such a manner that it shall fill the fissure so as to keep its sides apart, and by its presence prevent the acrid perspiration from coming in contact with the raw surfaces.

As a result of secondary syphilis the formation of fissures between and under the toes are quite common. Such fissures

are very painful, and they may become gangrenous, spread, and even destroy the whole toe, and endanger the life of the patient. Various ointments and liniments have been devised for the cure of such fissures, but none appear to be equal to a wash composed of five grains of choride of gold and sodium, dissolved in one fluid ounce of the tincture of myrrh, and that mixed with a fluid ounce of pure glycerine. A piece of lint or a soft woolen thread wet with this mixture and applied to the fissure, frequently renewed and worn constantly, will usually affect a cure of the local difficulty. If there is considerable ichorous discharge from the diseased surface, the muriated tincture of iron, undiluted, should be applied two or three times, at intervals of twelve or twenty four hours.

When fissures occur on the heel they may be filled with any of the mild ointments, and then the sides drawn closely together with adhesive straps, or what is better, with collodion, and the dressing renewed daily. When the fissure is very large and gaping, one or two sutures of silk or metallic wire, may be required before the collodion is applied. A mixture of equal parts of the muriate tincture of iron and collodion will be better than the simple collodion where there is any considerable erysipelatous or other swelling.

Gout.—Among the diseases to which the feet are liable is one, which, while it may *originate* in derangement of the processes of digestion, and consequent disease of the fluids of the system, yet, frequently localizes itself as a very painful affection of the extremities of the feet; and as attacking those extremities, this disease is far too distressing and too important to be passed by in silence in a monograph devoted to that part of the system.

Amylaceous food, in the processes of digestion, by the addition of the elements of water, becomes grape sugar, then by the addition of inspired oxygen, lactic acid. If the blood already contains too much urea, that may combine with the elements of lactic acid and also with some of the inspired oxygen, so as to form uric acid and water. If the person who has formed this acid within his blood does not enjoy much physical

exercise and does indulge in an excess of animal food and wine or brandy, his eliminative organs may not remove all these substances from the system; and, the quantity of acid may so increase that it eventually accumulates in the lower extremities which are far from the heart, where, owing to sedentariness of habit the blood does not flow briskly, and thus produce the *local* manifestation of *Gout*.

Gout is so uniformly located in the feet, and is so painful, that it is often known by the Latin name *Podagra*, (foot-pain.) It usually attacks those beyond mid-age, although instances are on record of youthful persons suffering from it. Very frequently the derangement of the digestive organs will have been sufficient to attract notice. A want of appetite, an accumulation of gas in the stomach, heartburn, nausea, and gastric tenderness, may have been felt for a few days. The urine may have become changed, dark, with a reddish sediment. The stools, also, may have been dark, sticky, and offensive. But often, after a period of apparently good health, the patient will be awakened an hour or two after midnight, with a pain in the ball of the great toe of one foot,—sometimes but rarely, the pain is located in the heel, or elsewhere. Along with the local pain there is a general feeling of chilliness or shivering which soon passes away, but is sufficiently distinct to prove that the fluids of the system are disordered.

As the local pain increases, the shiver gives place to heat. The pain increases in intensity, is sharp, twisting, grinding, wrenching, crushing, torturous,—with a burning as if a hot iron was prying the bones of the joint assunder. The local anguish is attended with a general feeling of restlessness and misery. The affected joint becomes rapidly exquisitely tender, and the tenderness extends to the limb.

After about twenty four hours the violence of the attack abates, the patient falls into a sleep, perspires, and continues to sleep until morning. Then the foot has become swollen, tense, shining, red, with swollen veins, and extended oedema of the neighboring parts.

For several days and nights there will be attacks and threatened attacks of paroxysms similar to those which ushered in

the disease, but gradually growing milder and less frequent, until the disease finally wears away, not to return until a renewal of the exciting cause. As the swelling and redness of the affected part subsides, the cuticle pulls off, dries up, and a very troublesome itching may cause considerable annoyance.

The attacks, which at first recurred only after intervals of two or three or four years, as the patient gets older, come on with greater frequency, until perhaps, the lameness may be almost continuous. After the first attacks, the joints appears to recover their natural condition perfectly, but, afterward they lose their pliancy, and become weak and stiff. After a time, especially as the patient gets old, concretions of lithate of lime or carbonate of lime, similar to chalk, or lithate of soda, collect around the affected joint, filling the areolar tissue, and collecting under the skin. This collection of calcareous matter is soft at first, like mortar or cement, and takes such form or shape as a semi-solid naturally would assume in the localities where it is deposited; but in time it becomes more dry and hard, and then appears like chalk.

When this material is deposited about joints it limits the motion of those joints, as it also does, to a less extent, when deposited around tendons. When, as is often the case, these chalky concretions are formed about and in the second joint of the great toe, all motion of that joint may be lost; and if the articular cartillages are encrusted with concretions, they may not only produce distortion and apparent elongation of, but actual dislocation, of the bones;—thus perpetuating the disease of the toe long after the acute attack of gout has subsided.

In regard to the nature of the *general* disease which causes the *local* affliction, nothing farther than the few hints here given, appear to be requisite. The discussion of its hereditariness, the peculiar constitutions more liable to it, the mode of life which leads to its developement, its frequent complication with derangements of the kidneys, with gravel or stone, the age and sex most liable to it, the derangements of digestion which usually preceed its paroxysms, its effects upon the action of the heart and the brain, its relation to apoplexy or paralysis.

etc., can more properly be considered in connection with diseases of the general system than with those confined to the feet.

• But it is well to determine, if possible, enough about the cause and nature of this disease to determine with definiteness in regard to the general and the local treatment by which it must be combated, and the parts affected restored again to the condition of health.

Under certain conditions of the body, as want of active muscular exercise, and where highly seasoned food and wines are indulged in, a large amount of *lithic acid* will be formed in the blood, more, probably, than can readily be eliminated through the kidneys, especially if they are also debilitated and diseased. That acid combines with the lime or the soda in the blood and forms the lithate of lime or the lithate of soda, which accumulates about the smaller joints, especially of the lower extremities, producing pressure, congestion, swelling, inflammation, and pain, in the structures in and near which it finds lodgement. The particular joints most likely to be affected are those which may have been injured by a sprain or strain, or have simply been over-exercised, so as to become less active in its vitality than other joints; or, been pressed upon by the the boot or the stirrup.

Gout in the feet is seldom, perhaps never, a *fatal* disease; but certainly it is sufficiently painful to demand the most cautious and persistent efforts for its removal. As physicians are seldom called to a case of gout until the patient has suffered from the paroxysm of an acute attack, the first thing will be to afford relief for that; and afterward the affection of the general system, or the local deposites, may be attended to.

Colchicum, properly administered, is capable of affording great, almost perfect, as well as speedy relief, to the agony of an acute attack of gout. It is used in a variety of forms. The seeds or the fresh root, steeped in wine to form the *wine* of colchicum, or the *vinegar*, using that liquid as a menstruum, or the *acetous extract*, prepared by evaporation from the vinegar, or the *inspissated juice* of the whole plant may be used. Each of these preparations are favorites with different prac-

titioners. They should be given in conjunction with, or about the same time with some saline cathartic. If a teaspoonful of the wine of colchicum is given at bed-time along with some warm gruel, and a Seidlitz powder, or a small dose of Epsom salts, and a smaller dose given, in a similar manner, twice next day, it is probable that a very severe attack of gout will be subdued within twenty four hours. But while the pain and acute manifestation of the disease is thus easily controlled by colchicum, the morbid poison may not all have been expelled from the blood, or if expelled, more may be formed or accumulate by the diseased action of the organism, and hence it will almost always be necessary to enjoin abstinence and caution in regard to the diet, a continuous use of a small quantity of colchicum daily for a few days longer, and also a continued use of a small quantity of a saline cathartic, to eliminate the changed poison from the system. The care in regard to regimen should never be neglected after an attack of gout, especially with those who appear to have inherited a liability to its attack.

The treatment here given may appear very strange to those who consider the pain in the foot simply as a local affliction; and if gout was a local disease it certainly would prove ineffectual. But although local in its manifestation, gout is as much a disease of the entire blood as small-pox is. But disease of the blood, even if of short duration, almost always produces disease of the more solid structures and organs, and hence, it is frequently necessary to do something for the cure of the secondary disease thus produced.

For the treatment of these secondary complications, one or two doses of the sulphate of quinia, of ten grains to the dose, and, if the heart is too active, five drops at a time, once in three or four hours, of the tincture veratrum viride, for a day or two, will suffice to subdue the disease completely.

If, when the acute attack has passed away, the foot resumes its normal appearance and condition, no local treatment will have been required, and only proper care and caution to avoid a return of the gout will be demanded. If, however, after one or repeated attacks there are discovered concretions of

lithate of soda or lithate of lime in the cavity of the joint or about the membranes and tendons, measures must be taken to dissolve and remove such deposits.

Mr. Ure, the demonstrator of lithic acid, has strongly recommended benzoic acid as an agent which *prevents* tophous concretions in gout, by holding in solution the lithate until it is thrown out of the system. He advises it in doses of twenty grains, to be taken an hour after each meal. Benzoic acid, in the system, is soon changed to hippuric acid, and taking the place of lithic acid, in combination with the lime or soda it is soon voided in the urine. Benzoic acid has acquired quite a reputation as an *Antilithate*, and it has been proposed to combine it with soda, or with potash *before* it is taken into the system, but, apparently without any sufficient reason. Phosphate of ammonia, which possesses the power of dissolving the lithate of soda, is also used in small but repeated doses, where deposits have already taken place. The benzoate of ammonia is doubtless better, while the joints still remain inflamed, red, and tender, and may be given in conjunction with colchicum in all attacks of gout after the primary one.

As iodide of potassium dissolves lithate of soda quite readily, it may be given somewhat freely in those cases where the deposit has been of long standing and is accompanied with stiffness of the joints, and particularly with decided want of motion in the tendons and ligaments. Benzoic acid and phosphoric acid are decided uragentic, but iodide of potassium is not, and therefore some stimulant to the kidneys should always be given along with this salt, not only in this disease, but in all cases where iodide of potassium is prescribed.

Whenever gout appears to be complicated with rheumatism, a modification of the treatment to meet the complication will be required.

Rheumatism is supposed to be produced by an excess of *lactic* acid in the blood, as gout is produced by an excess of free lithic acid in that fluid. Iodine, and the iodide of potassium, seem to act more readily upon lactic acid and the lactates, than it does upon the lithic acid and the lithates, and hence it is more valuable in rheumatic gout than in the un-

THE CLOTHING OF THE FEET.

THE objects for which shoes and boots *should* be worn are the same as those for which the other parts of the body are clothed:—To protect them from external injury, and to accord with the dictates of modesty and enlightened taste. But *taste* is so frequently sacrificed to *fashion*, and is so seldom enlightened, that, as there is no recognized standard, it is well to yield to it as little as possible and to clothe the feet in such a way as shall protect them from the roughness and hardness of the surfaces on which we walk, and also protect them from wet, cold, and heat.

That the clothing to which the feet are subjected has a very great influence on their form and structure and usefulness, and, when, as is usually the case, it is not adapted to their conformation and uses, is fully exemplified in the fashionable small feet of the females of the higher classes in China. The modes adopted by the parents to keep their girl's feet small and undeveloped, may vary somewhat, but is essentially as here described.

At about two years of age the four smaller toes are crowded under the ball of the foot, while the great toe is allowed to remain unbent. After the toes are bent under the foot, the entire foot is bound round with tight bandages to make it as narrow and short as possible and to prevent growth; and, in walking, the child treads upon the knuckles of the four toes which have been bent under the foot. Of course the toes become red and inflamed, and the bandages cause pain; but, as the toes accommodate themselves to their constrained position the pain subsides. The toes gradually lose their growth and action, and they become, as it were, almost amalgamated

with the ball of the foot until they almost disappear, and then the foot assumes a rounded and pointed shape, the end of the great toe forming its apex.

Then another operation is performed, of so severe a nature, that it causes the death of many delicate female children. The foot is curved downward so as to bring the point of the large toe under the sole and as far towards the heel as possible, and the foot is kept in that position by bandages. The bandaging is often renewed, but never loosened, and the foot bent gradually, more and more, month after month, until the tendons, ligaments, and bones, accommodate themselves to their constrained position, while the bandages are drawn tighter and tighter, until, at last, the great toe is bent upon what was the ball of the foot; and where the toe is joined to the foot is brought in contact with the heel, and all the toes and a part of the foot are doubled up and pressed under the arch of the foot, where they are bandaged into a clump.

The foot is turned down, and the back of the great toe and the heel, together, pass into the slipper, and that slipper contains the diminutive *Chinese foot*, a description of which so frequently excites the envy of fashionable belles and our shallow-pated beaux. The small foot of the Chinese woman is composed, apparently, of a bit of heel and a bit of toe, with a mark like a cicatrix after a cut, passing up between the heel and toe.

Sometimes, when the girl has not very wealthy parents and may be obliged to work for a livelihood, the toe and heel are not made to amalgamate so as to produce the genuine "small foot," but she attempts to disguise this misfortune in various ways. Often, on the marriage day a piece of cork is strapped on the sole of the feet, on which slippers are fastened so that the slippers are protruded from the dress, and the public are *supposed* to be completely deceived.

But the *natural* foot is the *beautiful* one, and the clothing should be so devised that it may protect it from the hardness and roughness of the ground, and cold, heat, and wet,—and not distort or crowd or crush the structures in any way; for the condition of the feet produces a very great influence

directly on the comfort of a person,—and, *indirectly*, its influence on the general health is a thousand times greater than is generally supposed.

No one who has a knowledge of the wonderful mechanism of the foot will doubt that the twenty-six bones, the most unyielding part of its mechanism, can be and are made to yield and become destroyed by improper pressure upon them. The long bones of the metatarsus and the toes are seldom allowed freedom of growth and perfect development by those who wear shoes and boots; and the arch formed by the metatarsus, as seen in the cut, is very seldom allowed to remain unchanged, to give that support and elasticity to the tread which is so distinctly shown in the gait of those who have had the bands and ligaments which bind those bones together and keep them in place, injured, and their functions partially destroyed by boots or shoes of improper construction. As the natural arch of the foot becomes somewhat depressed when the weight of the body bears upon it, the sole of the shoe should have sufficient breadth to admit of that expansion; and that breadth must be continued well forward, or the *toes* will become cramped and over-ride each other as is shown in the cut. The deformity and displacement of the toes produced by shoes with narrow soles is quite common, and is a frequent cause of many *Corns* as well as other diseases of the toes, some of which are so severe as to demand amputation of one or more of the extremities.

Or, as is sometimes, perhaps often the case, the sole of the shoe is made both too narrow and too short, the foot cannot spread out and the toes cannot extend themselves as the heel is raised in walking, and the person goes almost *stubbing* along like one on stilts, or like a Chinese woman with cork extensions. Narrow and short boots are apt to produce corns upon the toes, and such displacement of the bones of the great toe as to cause *Bunions*, which can never



Metatarsal arch as shown by a section of the right foot. Natural.



be cured while the foot is kept distorted by improper clothing. Bunions, produced by shoes that are both narrow and short are very common among women of sedentary habits, and among men who in their youth did not stand much upon their feet.

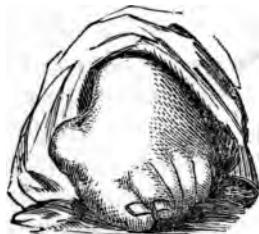
When, in addition to the distortion of the great toe and the ordinary bunion, there is a *gouty* or *rheumatic* deposit in and around the joint, adding to its prominence and consequently crowding the toes on the opposite side of the foot, frequently there will be a disease caused upon the dorsum of the little toe and on the outer surface of the foot, which resembles both a bunion and a corn. This disease will disappear while the bunion is being cured, if all pressure is kept from it:

Sometimes, when the shoe has been both too narrow and too short, the smaller toes suffer more than the great one, become bent down, and so crowd the flesh of the bottom of the foot into prominences, that a very troublesome kind of corn forms in the sole of the foot, which is not only very painful but is one of the most difficult of cure; for, as in the case of the feet of the women of China, the distortions and deformities caused by improperly constructed boots and shoes *become permanent*, or curable only by means of persistent counter treatment.

It is not every case of distortion which presents as great a deformity as is depicted in the cuts, but in some instances it is as great and even greater than the cuts represent; and in a few cases that have come under my observation, several forms of distortion have been produced on one foot. The great toe may have its point pushed under or over the second, with a



Bunion, etc.



bunion on the joint; corns may form on the knuckles of the toes, between them, and also on the sole of the ball of the foot; the small toe may lie nearly transversely across the backs of the others, with a swelling and tenderness on the outside of the foot; while the bones of the instep are bent upward, producing that peculiar prominence that some have called *aristocratic* and beautiful.

But the lasts on which boots and shoes are made, frequently, are not only too narrow and too short, but the sole or bottom, instead of being flat or slightly concave, to correspond with the concavity of the foot, but are really *convex*, as is shown when the last is sawed across at the instep, and the result is, at first the foot has to be bent as nearly into a tapering  cone as possible to be pushed into the boot, causing a strain and distention upon the muscles, tendons and ligaments, and a pressure of the bones and integuments of the foot, which renders the wearing of a tight new boot so painful on walking, damaging their usefulness, and perhaps producing an inflammation that is not only very distressing but dangerous.

Section of left last at the instep.

If the shoe is much too short it will almost certainly press upon the end of the large toe and upon the nail, especially upon the point and the root of the nail, displacing the nail somewhat from its natural position, pressing down its edges against the inflamed soft structures, and causing one of the most painful maladies to which the feet are liable.



In-growing Toe-nail.

The pressure of a narrow shoe upon the joint of the great toe, as has been shown, produces bunions, but if the inflammation extends to the bone it may cause new growth of actual bone, which may be mistaken for gout or for rheumatism.

These are among the common diseases produced *directly*

from the pressure of ill fitting boots or shoes. They are diseases which are so prevalent and are so constantly produced solely by the shoe or boot, that these diseases can seldom be cured without relieving the foot from all contact with the shoe as it is usually fashioned; and they are most certain to return whenever the old form of shoe is again worn. Even the least thoughtful are well aware that *corns* and *bunions* are the result of the constant pressure and irritation which the shoe has produced, and the profession require no evidence to establish the fact in their minds.

Flat Foot, or as it has sometimes been called, *Splay Foot*, is a disease produced by a stretching or loosening of the ligaments which bind the bones of the foot together, and a consequent sinking of the arch, so that the sole no longer presents the natural hollow, and the bones no longer being held in place, the entire foot loses its springiness, becomes tender, sore, lame, and comparatively useless. This disease is not very common among *men* who wear boots, even if improperly fitted, if the upper leather is somewhat firm and unyielding. Although the *last* on which the boot was made was convex on its sole, causing the sole of the boot to be arched *away* from the foot, yet the unyielding upper leather sustains the two sides of the foot so that the arch is not broken down, and a flat foot seldom occurs. On the contrary, the arch is increased as the middle of the foot is bent upward, the sole of the foot is kept narrow and thrown into wrinkles, the entire weight of the body is thrown upon the outer and inner margin of the foot so as to produce the corns which are sometimes formed in those localities; or, if the wrinkle in the sole is pressed upon, a corn, and a very painful one, will be formed about midway on the sole and just under the junction of the metatarsal with the tarsal bones.



But women, and men who wear slippers where cloth takes the place of the upper-leather of the boots, often find the sides of their shoes to give way to the pressure of the foot, the shoe becomes trodden to one side, the heel furnishes little or no support to the sole, becomes oblique, or worn lower on the

one side than on the other,—the whole of the external margin of the foot becomes raised, the arch gradually loses its convexity, becomes depressed, and the flat foot is the result.

After the arch of the foot has once been broken down, the ordinary shoe tends, not only to perpetuate the evil, but owing to unnatural pressure at various points, in-growing nails, bunions, or corns, are almost certain to be produced.



Splay foot.

Shoemakers, even the most intelligent and best intentioned of them, often perpetuate the evils with an absurd fashion or improperly constructed boots and shoes have caused. To render the shoe easy they often try to make it so as to *fit the foot*. But if the foot has become unnatural in form, shoes which *fit* it must tend to perpetuate the evil if not increase the difficulty.

If a short and narrow-toed boot has caused the point of the great toe to lie obliquely across the others, or has pushed one of the smaller toes under or over its neighbors, a boot so short and narrow as to be a fit must perpetuate and probably aggravate existing evils. Whenever a drawing is made of the foot, if the stocking is left on, the toes are unnaturally pressed together, and such drawing cannot be a correct representation of the natural foot. If a drawing could be made so as to be a representation of a *natural* foot, then, with the necessary modifications, it would serve as a guide for the shoemaker. As such a drawing cannot be made from feet which have become distorted by improper shoes, an *ideal* one must take its place.

Boots and shoes should be made long enough and wide enough to allow all the toes to resume and retain their normal position, and the natural position of the great toe is such that it lies nearly in a direct line from the heel through the entire length of the toe. If it is pressed out of that line it is unnaturally distorted. If the great toe has already become distorted the shoe should be made the same as if it was still in its natural position, and then, as the foot accommodates itself to the shoe, it will resume its natural form. If the joint of the toe is press-

ed considerably outward, by making the shoe so as to produce *gentle* pressure on the joint, no harm will follow, and the toe will be aided in resuming its normal direction. If the joint is considerably enlarged and tender, an experienced surgeon only can determine how the shoe should be made. *Too short* shoes are the great cause of distortions of the great toes, and bunions, as well as of ingrowing toe nails.

The *heels* of boots and shoes should not be high and narrow, but sufficiently low and broad that the foot may have a firm and steady support. And the *last* should be so constructed as to allow the heel of the foot to fit down into the boot or shoe, and thus keep the foot from slipping forward. Most boots are made on lasts that are too narrow at the heel, and hence the hind part of the foot is pinched and the elasticity of the cushion of the natural heel is rendered of no avail.

The upper part of a boot or shoe, of whatever material it is made, should be sufficiently loose across the toes to allow them to move freely in walking, and also to allow the great toe to retain or resume its natural position. If the heel of the foot has been allowed to sink into the heel of the shoe by a proper construction of the last, and if the arch of the foot has been somewhat supported by an elevation or thickening of the sole under the arch of the foot, there will be no trouble in fastening the boot or shoe by a moderate pressure on the instep so that the foot will rest easily and quietly in its covering. But, as boots are often constructed narrow soled, short, thin through the heel, and tight across the instep, it is an act of torture to crowd the foot into them; and then, when the foot is once wedged and compressed between the upper leather and the sole, it is only by means of a boot-jack that it can be relieved from its imprisonment.

No one can suppose that the head or the hand could thus be squeezed and compressed with impunity. Can the foot endure that torture and the whole system not be made to suffer also?

The foot is constructed of a number of bones thrown into a *double arch*, and that arch maintained by means of the bands and ligaments which bind the bones together, and then covered with tissues and integuments; and the health and utility

of the foot cannot be maintained except all the parts, and especially the binding ligaments, remain intact.

If the arch of the foot is broken by the flattening pressure constantly exerted upon it by a tight instep in the boot,—and the binding ligaments of the arch are also weakened by the same force, the arch may break down and *flat foot* be produced. Tight insteps to boots made of firm leather may not always cause flat-foot,—but tight insteps, as soon as the leather or cloth at the sides and end of the toes gives way, very often do cause this deformity; and many more among the women and middle aged men of our cities are permanent sufferers from this deformity than is generally supposed.

Tight insteps interfere with walking, as any one can tell by attempting a free and long walk with boots that press much upon the arch of the foot. All the anterior of the leg below the knee will become lame, and the toes will be rendered almost unavailing as aid to the processes of locomotion.

The only means which seem adequate to relieve the instep of all undue pressure is to so construct the last on which boots and shoes are made that there shall be sufficient breadth of heel to allow the foot to sit down at the heel freely,—depress the heel, and elevate the sole of the shoe or boot forward of the heel and under the arch of the foot, to give it fair and natural support,—and make the boot long, large, and wide at the toe, so that the foot shall not be pressed back against the instep. The upper part of the boot should fit the foot *snugly* but not *tightly*.

All the usual concomitants of a tight *new boot*, as sickness at the stomach, nausea, headache, palpitation of the heart, nervousness, inability to mental labor, pain in the feet or limbs, and the thousand-and-one forms of suffering which causes a new pair of boots to be dreaded as instruments of torture, can be completely and perfectly avoided by the use of boots and shoes of proper construction. And most of the diseases of the feet, as here detailed, being the direct result of improper foot-gear, can also be avoided by proper attention to the boots and shoes. After disease has fastened upon the foot, by attention to these matters, such diseases will admit of cure and can be

avoided in future, while without it they become a constant source of torment and are incurable. Hence the proper construction of boots and shoes are subjects which fall directly in the province of the physician and surgeon, and unless the profession attend to the matter, both the profession and the people will continue to suffer. But if the profession will by precept and by example, insist on a more rational and scientific construction of the clothing of the feet their influence will be immediate, direct, and permanent.

In order that proper ideas may obtain in regard to the construction of boots and shoes, not only must we remember that the feet are to be covered so as to protect them against the inequality, hardness and roughness of the surface of the ground, and the vicissitudes of cold and wet, but we must not forget the construction and organization of these extremities. We have already, in the Chinese foot, observed the results of systematic and persevering efforts to change the formation and growth of the feet; and, if we do not take into consideration the normal form and condition of these organs, as well as their objects and use, we may, unintentionally, cause changes which in kind, if not in degree, will bear a resemblance to those of the celestial women.

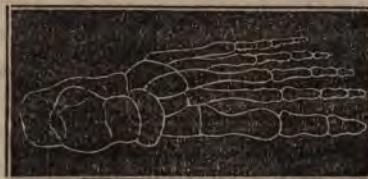
The attempt to mould the shape of the feet in accordance with the absurd dicta of fashion, is by no means confined to the almond-eyed Orientals, as the absurdly shaped boots often ordered by the devotees of fashion will prove. But the shoe should protect the foot from harm, not distort and disfigure it.

Shoemakers are sometimes ignorant of the principles on which the clothing of the feet should be constructed; but too often from want of thought or from ignorance of the anatomy and physiology of the complex organism on which their art is bestowed, they either blindly stick to the usages and forms which have become prevalent, or, endeavor to *follow the fashion*, however absurd and irrational the paths through which that leads.

The foot is composed, as is shown by the accompanying cut, of twenty-six bones, so arranged as to admit considerable motion, and yet so that the motion of one bone, in its natural

position, never interferes with the motion of any other. The long bones of the toes expand and extend so as to form the firm, elastic, useful foot, which, as clothed in the Indian moccasin, allows of free and unimpeded motion and a majesty of mein and freedom of action in walking which is seldom observed among those who have had the advantage of the so-called enlightened science and taste of the fashionable cordwainer.

If, instead of looking *down* on the foot, we stand at its side, and look at its inner aspect, we shall see, that its bones form a clearly defined *arch*, from the heel to the toe, which is quite as great, and as important as the *metatarsal arch*, or that which extends across the



foot from side to side. This arch is so constructed that the metatarsal bones, but par-

Metatarsal Arch. ticularly those of the great toe, and the calcaneum or heel bone, behind, are those brought in contact with the floor or earth; while the astragalus, or that bone which lies between the lower ends of the leg bone, forms the key or crown of the arch.

In the natural formation of the foot these arches are enabled to retain their form and the bones their position, while the feet sustain all the weight of the body, and frequently, of additional burdens also, by means of the ligaments and bands with which the bones are bound together. But if these bones are distorted and pressed into unnatural positions by badly constructed shoes, and kept in an unnatural position for a long time, they are sure to lose their power of motion, in part at least, and may suffer from some painful form of disease.

When speaking of pressure on the instep, and the production of the disease called *Flat Foot*, (a disease much more common than is generally supposed,) a cut of a vertical section of the common last, was given, which is here reproduced, that it

may be considered in contrast with a last constructed on the proper principles in accordance with the natural arched form of the foot. Most boot and shoe-makers take into consideration the arch of the foot from heel to toe, and make the sole of the boot, in the shank, thicker than under the ball of the foot, but only recently has the importance of this cross arch been appreciated, or any attempt been made to fashion lasts to fit it. When lasts are made, as they usually are, convex on the bottom, and the foot falls down so as to meet the sole of the boot or shoe, all form and comeliness of both the foot and its covering will be lost, and the transverse arch of the foot will be injured, if not destroyed. But, with a last of proper form, and the sole made *thicker* in the middle under the ball of the foot, the bones will be sustained in their natural relations to each other ; the bands and ligaments will not be subjected to a strain beyond their powers of resistance, the metatarsal arch will remain intact, the springiness of the natural gait will be preserved, the foot will retain its beauty of form, and the shoe will wear much longer than those made on lasts which are convex at the sole of the ball of the foot.

In order to preserve the arch which extends from the heel to the ball of the foot, the *heel* of the last should be at least half an inch lower than it is in those as usually made; and, as has already been said, so broad that the heel of the foot will readily slip down to and rest easily upon the sole. The heel part of the last should be much *more convex* than usual, as well as deep and wide, so that there will be some room for the natural expansion of the cushion which naturally grows beneath the heel bone.

When a person stands on his feet these arches are somewhat flattened by the pressure of the weight of the body upon them, but not by any means so as to obliterate them ; and as the



Section of the common Last.



Transverse section of a well constructed Last, and proper sole.



weight of the body is thrown forward on the toe, or the foot is allowed to swing free, the curvature of the arches are increased. Each step taken in walking, if the foot is natural, and the boot or shoe has been made on a well formed last, causes all the bones and ligaments of the foot to move; and, as the feet are raised from the ground, the curvature of both arches become distinctly more developed, by the action of the muscles of the leg in the act of lifting the foot.

I wish to be emphatic and pointed in calling attention to the arches of the foot, and their importance, because most last makers, and many shoe-makers, seem to have conspired for their destruction.

The great toe, lying in front of the arch, has one less joint in its bones than either of the smaller toes, and it is of more importance in the act of walking than all the other toes combined; consequently its structure and functions deserve the special attention of the maker of shoes. The natural form and position of the bones of the great toe have already been shown in the cut representing the bones of the foot as seen when looking down upon them. But



they are often bent out of their natural direction, as seen in the cut in the margin, simply because *fusion* has demanded

a shoe narrow and pointed at the toe. Even one of the forms here delineated, although by no means as bad as many which are worn, cannot allow room for the great toe to retain its natural direction; and the result is, that toes with their natural power, and which rest with their points evenly and squarely upon the ground, as the heel is raised and the body is impelled forward, in walking, are very rarely to be found among fashionable people. That the natural form of the sole of the foot may be known, (for as has been said, such feet are somewhat rare,) I here introduce a fac simile drawing of the foot of a child two years of age, who had



never worn a shoe made on a fashionable last. The line shows the direction of the foot and toe, and the manner in which the centre of gravity passes from the heel to the toe in walking, until the great toe supports the weight of the limb as another step forward is taken.



Natural foot of a child two years old.

The smaller toes are not without use. While the person is standing they rest upon the ground and give lateral support to the foot, and in walking they are bent down so as still to give lateral support to the foot. If not distorted nor confined, they render considerable aid in both standing and walking; but they, too, are often very seriously injured and their usefulness partially destroyed by badly formed shoes.

THE SOLE OF THE SHOE.—Ordinarily, to make what the shoemaker calls *a fit*, he takes no measurement for the sole of the shoe, except as to the length of the foot, and, perhaps, the distance *around* the foot just where it is the broadest. The length of the foot is a matter of primary importance; but the *breadth* of the foot, not the distance around it, should also be taken into consideration. If the shoe is to have no heel, be made of cloth, or light, yielding leather, and be worn on either foot indiscriminately, the last selected must be what is called straight, with but little convexity to correspond with the natural arches of the foot; but with more than the usual breadth, both at the heel and in the shank. Across the ball of the foot the breadth must correspond with that of the feet on which it is to be worn, or the yielding *upper* will give way across the ball, spread beyond the edge of the sole, lose all comeliness of shape, and perhaps cause and perpetuate the flattened arch which produces one variety of the *splay foot*.



If the toe of a shoe of this construction is narrow, the upper being sustained by the sole, does not yield but bends and

cramps the toes, incapacitating them from the performance of their natural functions, and the foot is finally distorted into a misshapen lump somewhat like that depicted in the cut. Many women, with beautiful faces and forms, and hands of the most perfect proportions, have feet quite as much deformed as the cut represents.



Shoes and boots with heels to them, and made of firm leather, are sometimes made on straight lasts; and, if worn on the right and left foot, and changed each day, they will retain their form; and, the feet yielding first in one direction and then in the other, may not become greatly crowded out of their natural shape, but will be certain to lose a part of their functions, and become liable to the invasion of disease. Inflammation and ulceration of the cartilages and bones have been directly traced to the pressure of narrow and stiff shoes made on straight lasts. If the shoes which were made on straight lasts are *not* changed, they yield in shape in part, as well as the feet, and finally assume an outline like that indicated by the dotted line in the cut. This is much more near the natural form of the foot than the straight sole, but not as correct in its outline as the one depicted on a preceding page.



The drawing in the margin of the page was taken from the foot of a young woman, who had been accustomed to wear light shoes, made on straight lasts with narrow shanks, and the foot was less distorted than many;



yet a comparison of this drawing with that of the child's foot will reveal the fact that the great toe has been pushed out of a direct line and the other toes are cramped, while the ball of the foot is prominent and liable to be afflicted with inflammation and the formation of a bunion.

Sometimes an attempt to wear shoes made on a straight last and too narrow in the toes will not only produce distortion of the toes, but, when the shoe has been quite narrow and short, the second toe will override those next to it and cause them to become nearly useless, almost sure to be afflicted with corns, and corns not seldom form in the folds of the skin at the centre of the foot just at the root of the toes. Boots and shoes which produce this form of distortion are quite apt, also, to cause inflammation, swelling, and extreme tenderness of the outer edge of the foot back of the little toe. Perhaps this tenderness of the edge of the foot is more frequently caused by boots which are too straight and too narrow across the toes than in any other way. Once in a while feet that at first glance appear but little distorted, will be found with very painful corns upon the little toes, with intense neuralgic tenderness and thickening of the skin and tissues on the outer margin of the foot. But a more careful investigation of the matter will reveal the fact that the great toe has been crowded out of its proper direction; that the metatarsal arch has been at least partially destroyed; and that the extreme tenderness of the margin of the foot is owing to the fact, that, with the loss of elasticity, the foot has been subjected to continuous and severe pressure.

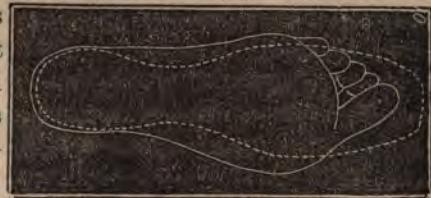
Once more it may be necessary to contrast these distortions of the form of the foot, with a foot which has not had its form changed by means of improperly constructed boots or shoes, and the cut in the margin, from the drawing of a natural *adult*



foot, is introduced. It is not exactly of the form which is admired by dandies and fashionable boot-makers, but of the form that our Creator has given as that best adapted to fulfill the uses and functions of the natural organs. This cut, and the one taken from the drawing of a child's foot, should be examined carefully by all who have occasion to make boots and shoes, or who have the care of the feet of children and young persons.



In marked contrast with the naturally formed foot, the drawing of one from a girl twenty years of age, who had been accustomed to wear shoes which were both too short and too narrow, may well be given. Unless the shoes are made of very unyielding material, if too short, the foot will become broad, dumpy, flat, and of a shape similar to the one here depicted. Many, if not most of the bunions, corns, and other diseases of the feet of our fashionable ladies, have had their origin in shoes both narrow and short. Many cases of ingrowing nails, bunions, flat feet, as well as other forms of disease had the same origin. Not seldom, where the shoe is both too short and too narrow at the toe, there will be formed a transverse wrinkle in the upper-leather just at the joint of the great toe, where it joins the foot. Each step that is taken causes the toe to be pressed backward and against the other toes, while the wrinkle, formed by the bending of the shoe also presses against the protuberance, subjecting the diseased part to a two-fold pressure at the same time. The result is, that the bones are permanently distorted, the part pressed upon is constantly inflamed, and the disease extends from the skin to the bands of the joint, and from thence to the bones themselves, pro-



ducing a new growth of bone, or, as in some cases, the formation of matter, softening and destruction of one or more of the bones of the toe and foot, and final loss of a part or the whole of the diseased extremity.

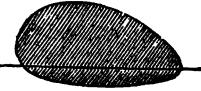
The unseemly swelling, at the root of the great toe, which is sometimes called chilblain, and sometimes rheumatism or gout, is usually the natural result of shoes or boots, but particularly of the *sole* of the shoe, having been made of an improper shape and form.

I have extended my remarks on the *sole* of the shoe, and have introduced cuts illustrating some of the more common diseases produced by badly formed boots and shoes, because the sole is the firmest part of a shoe or boot, and that part which gives form, shape, and character to all kinds of foot-gear. As this is the part of the shoe which has the greatest influence in giving form to the whole, and in giving comfort, or causing and perpetuating disease in the wearer, it is proper to consider it still farther.

MEASUREMENT.—As shoemakers are not anatomists nor surgeons, in taking the measurement of feet they do not always consider the acquired deformities, and their mechanical cure. Even where the foot has already become considerably distorted and crippled, those who wear, as well as those who make, shoes, often think that a shoe which fits the foot is the easiest and the best. This is an important error, which must, if acted upon, always tend to perpetuate any existing deformity, and often directly increase the evil.

As at once will be seen on examining the preceding cuts, whenever the toes are bent out of their natural form, the foot becomes shorter, and often more pointed across the toes than natural,—and if the shoe is a snug *fit*, the toes cannot resume their normal position, but the distortion will become fixed or aggravated. If, as is sometimes the case, a piece of leather is tacked on the last so as to make the shoe more loose over the projection of the great toe where it joins the foot, while the point of the shoe still remains narrow, the evil is sure to be aggravated, as room is allowed for still greater displacement of the root of the toe. To *cure* such deformities, the sole

should be made a trifle narrower than the foot at the place where the root of the toe bulges out, and considerably wider than the foot from that point forward, allowing, and, as it were, inviting the toe to resume its natural direction. A wedge-shaped piece of cork, placed between the great toe and the one next to it, to gently crowd it into its natural direction, will hasten the cure.

But the shoe must not be made too broad as the fashion sometimes demands. They are very unsightly, and, being too loose forward of the instep, cause too much strain upon the arch of the foot, which they break down, inducing looseness of the ligaments which bind the bones of the foot together, and finally cause *flat foot*. This is a somewhat common form of deformity, caused in part from the heavy shoes of laborers and others being made too broad, but particularly from the shoes having been made upon a last convex on its under surface at the ball of the foot, instead of on a last with a concavity there, to accord with the concavity of the  natural foot.

A method of measurement adopted by some careful shoemakers, is to draw an outline of the foot upon a sheet of paper, and making the shoe to correspond, or as nearly as possible of exactly the form of the foot. This will do very well for  those whose feet are *natural*, for the shoe should be of a form to fit a natural foot. But those with natural healthy feet seldom require the shoemaker to take this amount of trouble. Only those who have suffered from distortion and disease are accustomed to give specific directions about their boots and shoes being made large or loose. With the feet natural and healthy, such a drawing is not needed; and if the feet are already deformed and the shoemaker works accurately by such drawing, he simply perpetuates the deformities which have been caused by the shoes formerly worn.

Even when the foot is not in any manner distorted, if the drawing is made while the toes are pressed together with the stocking, the great toe, being bent obliquely toward the others

by the stocking, and the little toe bent by the same means under its neighbor, the drawing and the shoe will be too narrow and too pointed at the toe, and the foot will be permanently confined in a constrained position, until some degree of distortion will remain permanent. A correct outline of the foot as it should be and is in its natural condition, can only be taken from a foot entirely uncovered, and that outline modified and corrected from a knowledge of the natural construction of the foot. Such a drawing would answer as a guide for the shape of the *sole* of a boot or shoe. But drawings made from the foot in a state of nudity are not often required to guide the shoemaker. If a correct measurement be taken of the distance between the heel and the point of the great toe, *while the toe is made to assume its natural direction* and is *straightened out*, by means of the usual measuring stick, and the shoe made enough longer to accommodate the great toe in its natural motion in walking; then the natural breadth of the heel taken in the same way; and also the broadest part of the foot, at about half the distance from the end of the great toe to the instep, all the measurements required for the *sole* of the shoe will have been made. If the shoemaker has good taste and enlightened judgment, with the foot before him, and the aid of these measurements, he can complete the outline of the sole so as to give support, protection, and comfort to the wearer. If, from any cause, it is desirable that the shoes should be narrow at the toes, the narrowness must always result from a part of the *outside of the soles* being taken away. Straight and narrow soles are always dangerous and never beautiful; but the little toe can bear some pressure without material injury, while the great toe cannot be pressed out of its natural position without more or less discomfort and more or less interference with the processes of locomotion.

In other measurements, as around the heel and instep, round the waist of the foot and instep, around the broadest part of the foot, and around the foot just where the great toe joins on to the foot, are too well understood to require any notice.

The Sole, in all cases, where the distortion is not *very* great, should be of exactly the form and size which would be proper if the foot was natural. The distortions which were caused by the pressure of improperly formed shoes can often be completely cured by other pressures which tend to bring the foot back to its natural shape. If the lasts are made with a *concavity* in the sole instead of a convexity as is usual, and one be selected of the proper amount of concavity and of proper size and form, and the in-sole adjusted carefully to the bottom of the last, and then the hollow produced by the concavity of the last filled up with a single piece of leather thick in the middle and thin at its edges, the sole of the shoe can then be applied perfectly flat and level, to correspond with the ground or floor. Shoes and boots constructed with such soles give easy support to the feet, have none of the uncomfortable *rocking* motion of shoes that have been made on a convex last, and never allow the arch of the foot to give way.

THE HEELS are really of some use, especially in muddy weather, and they are fashionable, therefore they cannot be dispensed with. If the last is properly constructed with the heel at least half an inch lower than it is in the common last, broad, and much more than usually *convex*, the heel of the foot will set well down into that of the shoe, the usual anatomical evils of a high heel will not be experienced.

If, on the contrary, the heel of the last be made higher than the ball of the last, somewhat flat and narrow, (and most lasts are so made,) and then the heel of the boot is made high, narrow, and short,—the weight of the body is thrown too much forward, the heel is unsteady, the foot tends to slip more and more forward in the boot, the toes press with their points, are injured, distorted, have corns, bunions or in-growing nails are induced, and the foot is crippled in many ways.

High, narrow and small heels wear obliquely, get trodden to one side, twist the foot, and tend directly to injure the ligaments and bones of the feet. The heel-piece should be low, broad, and at least half an inch longer than the present fashion, and brought well into the shank of the shoe and worked under at the heel.

The Uppers.—Leather is most in use for the construction of the uppers of boots, but the increasing cost of the skins of animals leads manufacturers and dealers to hope that a suitable substitute may be found. But little need be said in regard to the uppers, as the selection of the material for this purpose will be governed by taste and the needs of the people; and the *sole* almost entirely determines the shape and form of a shoe.

But there are a few ideas in connection with the uppers which must not be forgotten. Care must be taken to have the upper sufficiently pliable to allow free motion to the toes in walking, and it must be loose enough along the inner margin of the shoe to allow the large toe to remain in its natural position, or the care taken in the construction of the sole will be partially lost. The idea which has obtained, that there should be two thicknesses of leather over the toes, in walking shoes, would have been productive of great harm, but that shoes so constructed are usually much wider and looser than common.

While the upper should be full and loose at the toes and as far back as the ball of the foot, it must be snug at the instep, snug but not tight; and this condition can be obtained with comfort to the wearer, only by means of lasts with low, concave, and somewhat broad heels.

The essentials of a properly constructed boot or shoe, are:—

1. Protection of the feet from the irregularities of the surfaces on which we tread, and from cold and damp.
2. An accurate and easy fit.
3. Sufficient elasticity to allow some degree of freedom of motion to the various joints of the feet.
4. Support to the arches of the feet, so as to insure a firm and elastic tread in walking.
5. Room for the heel, that it may sit down and prevent the foot from sliding forward so as to produce unnatural pressure on the toes, the sides of the foot, or the instep.
6. Such general form and construction that neither the toes, the heel, the instep, the bones, the ligaments, nor any part of the foot shall be so pressed upon or interfered with, that it cannot readily and with ease perform all the functions for which the feet were designed.

That boots and shoes, as usually made, do not conform to these essentials is painfully proved by the experience of many, if not by that of a majority of the people. But that they can be made so as to insure these essentials, is also already proved by the experience of such as have worn those made according to the directions here detailed. And that the proper ideas which should guide the makers of boots and shoes may be diffused throughout the land, only requires of physicians that they give this matter a little of their attention, and instruct their friends and the public.

Physicians have sometimes neglected to become as thoroughly acquainted with the processes of manufacturers and the mechanical arts and trades, as is requisite to enable themselves adequately to fulfill their highest functions as conservators of the public health; but the profession is daily becoming more and more clearly convinced that the first and greatest object of the physician's care is the *prevention*, and only the second is the cure of disease. Prevention of disease is noble, almost god-like, and to save the people from suffering and premature death, is certainly deserving higher commendation than has ever been bestowed upon man for any lesser good.

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